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# China Report

ECONOMIC AFFAIRS

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# CHINA REPORT

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## NATIONAL POLICY AND ISSUES

### SUN YEFANG ON ECONOMIC EFFECT

HK160001 Shanghai SHIJIE JINGJI DAobao in Chinese No 28, 13 Apr 81 p 4

[Speech by Sun Yefang [1327 0396 2455] at the Conference on Theoretical Problems of Economic Effect: "Taking About Economic Means Getting the Greatest Returns for the Lowest Outlay"]

[Text] That we can today convene a nationwide conference on the question of economic effect is itself of historical significance, because, during the "10-year turbulence," talking about production, or about economics, especially about economic effect, was regarded as not putting politics in command, and as neglecting the class struggle.

I still remember, in the late 1950's, that in discussing the outline of textbooks for socialist political economy, the former institute of economics of the Chinese Academy of Sciences raised a question--what is the red thread running through socialist political economy? Some comrades said, the red thread is the class struggle. Some others said, the Red thread running through socialist political economy should be the basic contradictions in socialist society, that is, the contradiction between superstructure and economic basis, and that between relations of production and productive forces. Economy must be stressed in socialist political economy--socialist political economy does not mean reading political or philosophical textbooks. Socialist economy has to prove that socialist relations of production can manage things more economically, and push ahead with the development of production more effectively than its capitalist counterpart.

I said, I whole-heartedly agree that socialist political economy must stress class struggle. That is to say, we must talk about the superiority of socialism, the necessity and the inevitability of the replacement of capitalism by socialism, and so forth, but we cannot turn a textbook on socialist political economy into a textbook on politics or class struggle. We must talk about class struggle through analyzing socialist relations of production and in the realm of political economy, instead of vaguely and generally. I also said, a textbook of socialist political economy should reflect the basic contradictions between superstructure and economic basis, and between relations of production and productive forces, and show the fact that in one aspect the socialist superstructure conforms to the economic basis, and the relations of production to the productive forces, while in the other aspect, they clash with each other. That is the very reason why we still have to unceasingly improve the superstructure and the relations of productions in our socialist society to meet the need of the development of productive forces. However, we



cannot turn a textbook on socialist political economy into one on historical materialism. We must reveal the feature of political economy which differentiates it from historical materialism and philosophy as well. If we only keep our eyes on those general principles of philosophy such as contradictions between superstructure and economic basis, and between relations of production and productive forces, we will not be able to distinguish between a textbook on socialist political economy and one on philosophy. Then how can a textbook of socialist political economy ever be distinguished from one on politics, on class struggle on philosophy, and on historical materialism? The point is, we must prove in a textbook of socialist political economy that the socialist relations of production can manage things more economically and push ahead with the development of production more effectively than the capitalist ones. In short, a textbook on political economy must talk about economics. And what really is economics? Economics means to gain the greatest returns for the lowest outlay. We must prove, by analyzing and studying the socialist relations of production, that the socialist relations of production can achieve greater effect with the lowest outlay, and thus push ahead with the development of social economy more effectively than the capitalist relations of production.

No Talk About "The Greatest and the Lowest," But Instead About "The Smallest and the Highest"--This Practice Consequently Led the National Economy to the Verge of Collapse and Brought Shame to Socialism.

However, my saying of "the greatest and the lowest" was unexpectedly condemned as a crime of not putting politics in command and negating class struggle, and provoked a great deal of criticism in the period of the "cultural revolution," or even earlier in the "four clean-ups" movement. At that time, I felt it really ridiculous. I thought, if we did not talk about "the greatest and the lowest," then could we ever talk about "the smallest and the highest"--gaining the smallest returns with the highest outlay? For sure I dared not ask such a question then. But now the "10-year 'turbulence'" has passed, and the very facts prove that we actually spent the highest cost for the smallest returns in the last 20 years. In the "cultural revolution," the policy of setting profit as the guideline was severely attacked, only settling "political accounts" was allowed and "settling economic accounts" was forbidden. At that time, destroying production was a merit and promoting it a crime. As a result, the national economy was led to the verge of collapse and the name of socialism was blackened--our economy even lagged behind countries and areas such as Singapore. Objecting to talk about "the greatest and the lowest," objecting to the advocacy of economic effect, vainly putting politics in command, and promoting class struggle: these practices consequently produced a converse effect--"the smallest and the highest." In fact, the proletariat should promote production and pay attention to economic effect as soon as it has seized political power. This opinion was expressed by Comrade Mao Zedong before the liberation. In "On Coalition Government," he said "in the last analysis, the impact, good or bad, great or small, of the policy and the practice of any Chinese political party upon the people depends on whether and how much it helps to develop their productive forces, and on whether it fetters or liberates these forces." Later, in his comment on the article "Run a People's Commune Industiously and Thriftily," he also pointed out, "let us run factories shops, all state-operated and collective enterprises, all other undertakings industriously and thriftily. We should carry out the principle of industriousness and thrift in everything."

In his comment on the article "the experience of the agricultural producers' cooperative of Lizhiyuan in Zenru District, in economizing production costs," he said again, "all socialist economic undertakings must pay attention to making maximum use of all manpower and equipment, to improving labor organizations, business administration and labor productivity as much as possible, to saving any manpower and material resources which can be saved, and to carrying out the labor emulation drive and economic accounting, so as to lower costs, raise personal income and increase accumulation year by year." In these quotations, Comrade Mao Zedong talked about developing production as well as about economy and economizing, and that is the very principle of "the greatest and the lowest." Nevertheless, in the years after, talking about "the greatest and the lowest" could unexpectedly become an evidence of crime in objecting to class struggle and negating the guidance of politics. On the contrary, the practice of "the smallest and the highest" was praised. Consequently, as I have just mentioned, in such a way was the name of socialism blackened. In effect, all these practices during the 10-year turbulence had nothing to do with socialism. All comrades present at this conference today, I believe, have confidence in the superiority of socialism. What happened in the past was not because socialism lost its superiority, but because the superiority of socialism was interfered with by agricultural socialism and feudal guild mentality. With feudalism competing with capitalism, so we certainly had to lag behind others.

Today we have entirely negated the nonsense dominating the times of Lin Biao and "the gang of four." We must readvocate "the greatest and the lowest" and take economic effect into account. This is the new hallmark for us in starting again to advance in big strides along the socialist road. Provided we observe the principle of "the greatest and the lowest" and take economic effect into account in every undertaking throughout the country, we believe that we will soon catch up with and surely surpass those countries and areas such as Singapore and even developed capitalist countries eventually. Advance along the road of taking economic effect into account--we must study not only theoretical economics, but also concrete economics. We should also encourage studies in technical economics, and appraise the economic effect of every practice of business administration and every technical measure in terms of technical norms.

In order to improve the efficiency of our agriculture, industry, communications and transport and all other aspects of economic activities, we can basically proceed in two ways. One is to improve the administration of the national economy and the management of enterprises; the other is to carry out continuous technical innovation and technical reform. We must evaluate every reform, every improvement of macroeconomic and microeconomic administration, every technical innovation and technical reform, in the light of the principle of "the greatest and the lowest" and in terms of economic effect. Therefore, as economists, we must study not only political economics, or theoretical economics which we are talking about right now, but also concrete economics, including what we used to mention--sectional economics, for example, agricultural economics, industrial economics, communications and transport economics, and so on. We should also advocate studies in technical economics. Our Chinese Academy of Social Sciences has just set up an Institute of Technical Economics. Whether this academic organization of technical economics should be independent and unique, or whether every economic section should have its own research office of technical economics, is still a question to be discussed. But, there is no doubt that we must advocate studies in technical economics and in

technical norms. To appraise the economic effect of every practice of business administration and technical measure in terms of technical norms is extremely necessary. In the past, we did little study of concrete economics, sectional economics and technical economics. In particular, technical economics was mostly negated before. As I have never studied this subject, I have no right to speak here. I would rather limit myself to my own speciality, talking from the viewpoint of political economics.

Get rid of the idea of natural economy--there is no concept of quality of product, nor of value in this idea. Our economic system embodies this kind of viewpoint: planning departments are responsible for the index of quantity in kind, and departments of finance and trade for the index of magnitude of value. This form of system in which use value is divorced from value must be changed.

In the sense of economic effect, I think, it is not true that we can do nothing with political economy. On the contrary, we have a lot of things to do. First of all, we must get rid of and criticize the idea of natural economy because it does not consider the quality of product and economic effect. If it does, it must be, in most cases, in the form of linking up with commodity economy--it just seems that economic effect, the quality of product and the principle of "the greatest and the lowest" do not have to be considered outside the commodity economy, I don't want to talk too far, I just want to explain that there is neither a concept of duality of product, nor that of value in the idea of natural economy. For example, if we ask a peasant, "how much does it cost you to make this table? How much value?" He just cannot answer. He will say: "This does not cost any money of mine. The wood, I got it from a tree in my backyard, which I cut down and sawed into planks and bars. I made the table with them. All these jobs I did in leisure evenings in the slack season, and I would not be rewarded in money otherwise." In his point of view, it seems that no money spent would mean no value. If you ask him about those concepts of average socially necessary labor, value and so forth, he just has no idea. As a small farmer, an individual farmer, he naturally has no such concepts, because, as we all know, value, average socially necessary labor, all these are concepts of socialized great production. He also has no concept of abstract labor, but only of concrete labor. Therefore, when you ask him how he made the table, he can only think about labor in cutting trees, sawing wood into planks and bars, and assembling them into a table. Since he does not have the concept of abstract labor but only of concrete labor, he naturally does not have the idea of average socially necessary labor, let alone the concept of value. Then, will he gain the concept of average socially necessary labor after the collectivization of small farmers and individual producers? Not necessarily. Generally speaking, small farmers do not consider the great production and integrated production after the collectivization from the viewpoint of modern socialized great production, they actually imagine the great production of our socialist society in the perspective of feudal manorial economy instead. And the latter is another form of self-sufficient economy, where there is no circulation and exchange, where people have neither the concept of abstract labor, nor that of average socially necessary labor, nor that of value, and don't care about economic effect.

Our economic system in the past many years, I think, also embodied this kind of natural economy concept. I still remember I have talked about this problem in an article. I said, our present planning commission (planning departments) was divorced, at least to a certain extent, from finance and trade departments. Our



planning departments only paid attention to the index of use value, and we talked about speed and quantity of production, all of which were quantities of use value. Our gross output value--the gross output value in terms of invariable price--was naturally expressed as a comprehensive index in kind, and the working out of plans, in considering basically speed and quantity of production, dealt in effect with the index in kind, whereas the finance and trade system had to do with indices of circulation and value. In other words, value and use value were dealt with separately, these practices were not our own invention but something borrowed from the Soviet Union. Russia before the revolution was also an economically backward country where the concept of natural economy dominated the thinking of economists and economic workers. This system of our type was originally implemented in the Soviet Union, it was worked out there under the guidance of the idea of natural economy which attached importance to the index of use value while neglecting the index of value and economic effect. Just for this reason, the front of capital construction was stretched too long and supply, production and sales were divorced from each other.

All these consequences resulted from the separate administration of use value and value, the divorce between them, the negation of circulation, the neglect of economic effect, and so forth. At present, in our country, production is divorced from demand, capital construction is divorced from financial capacity, material resources and manpower. We do not consider these latter factors in capital construction. Therefore, I believe, in order to change this situation, we must get rid of the system in which planning departments deal with the index in kind while finance and trade departments deal with the index of magnitude of value. [A note at the end of the page says this article as continued on page 8. It is not].

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## NATIONAL POLICY AND ISSUES

### SUN YEFANG ADDRESSES ECONOMIC FORUM

HK140647 Beijing JINGJI YANJIU in Chinese No 2, 20 Feb 81 pp 14-18

[Speech by Sun Yefang [1327 0396 2455], 8 Jan 81: "Several Preconditions for Improving the Overall Balance of the National Economy--Speech at the Forum on Theory of Overall Balance of the National Economy"]

[Text] The convening of this forum on the theory of overall balance of the national economy is very timely.

Not long ago, I said that one should not regard planning as the only or essential characteristic of a socialist economy. The reason was that the essential characteristic of a socialist economy is the producer. On the basis of the system of public ownership of the means of production, the laboring people are masters of their own affairs and have direct control over the whole social economy. It is wrong for one to overlook this point and regard planning as the only characteristic of the socialist economy. However, I also stressed that one of the principal superiorities of the socialist economy was its planned nature. Planned economy or planning, in essence, is the improvement of the overall balance. That is to say, to maintain a better balance between production and consumption, between consumption and accumulation, and between income and expenditure. It also involves the balance between the production of the first and second categories of the means of production and the balance between the various principal products of the various departments within the first category or between the products of the various categories. Finally, it includes the balance of finance, credit and resources (also foreign exchange) and the balance among them. In the past, there was a popular saying in our planning work that: equilibrium is relative and disequilibrium is absolute. The human will was put before everything else and the setting of high targets and the creation of economic loophole were regarded as "positive equilibrium." From the "indigenous leap forward" of the late 1950's to the 10 years of chaos and catastrophe and right to the "foreign leap forward" just before the third plenary session of the party, the proportions of the national economy had been seriously disrupted. Nonproductive labor led to colossal waste. In addition, to political reasons and errors in the guiding ideology of economic construction, an important reason was the denial of overall balance. From the philosophical point of view, it is true that equilibrium is relative and disequilibrium is absolute. However, when we are fulfilling the tasks of economic planning and economic work, we should always try our best to balance the various proportions. It is the minimum requirement of planning work to balance the disequilibrium. However, those who upheld the human will above everything else did not even have such basic knowledge and

they put their blind faith in authority, as a result, they repeatedly disrupted the national economy. In the end, the national economy was brought to the verge of bankruptcy through the so-called "cultural revolution." Before the 3rd plenary session of the 11th central committee, we lacked adequate understanding of the actual situation of our "bankruptcy." We wanted quick results, large projects and things from abroad, we also initiated many unrealistic large projects. This in fact intensified the proportional dislocation. It must be admitted that such proportional dislocation has brought tremendous potential danger to the current economic work. Any mishandling would directly affect the security of the party and the nation. There is really much work to be done if we want to get through such a predicament. However, readjustment means a resolute attempt to retreat from the road of the "leaps forward." Such retreat should go so far as striking a balance between national economic construction and our actual human, material and financial resources. We should gradually stabilize our economy and adjust the various proportions through balancing our finance, material resources and credits. It is my opinion that readjustment, in this sense, actually implies the attempt to strike an overall balance. Therefore, no matter whether from the perspective of summarizing historical experience or the perspective of carrying through the principle of readjustment, overall balance is an extremely important theoretical and practical problem.

Here, I venture to suggest several points on the precondition for maintaining overall balance.

First, in order to maintain an overall balance, we must change the existing price system and readjust the existing irrational prices. The objective of the socialist planned economy is to produce the various concrete varieties and specifications of material wealth. In other words, the objective of developing the socialist economy is to increase the use value. Therefore, in planning the economy, qualitifiable targets of the product output should be included in the plan. But how to fulfill these targets? The key hinges on how much human, material and financial resources can we put into it. The criterion is getting more done on less money, economizing on human and mechanical labor and increasing economic effects. Then, on this basis, work out the most rational distribution of the available human, material and financial resources among the various production departments. Furthermore, we must also make economic comparisons between the various proposed investment programs. Therefore, although the objective of economic development is the increased output, that is, use value; it is still necessary to plan the value targets. We should not just aim at the overall balance of product output and concern ourselves only with the speed of development without considering the overall balance of human, material and financial resources or the balance of the value target. This would be just like wanting to cross the river without considering the means for crossing it. It is common knowledge that value is expressed in terms of price. In modern socialized production, the investment of fixed capital has an important effect on the development of social production. In order to calculate the economic effect of investment, we must make use of the profit rate of capital and the production price. Furthermore, the price of products should be determined by the sum of the average cost of production plus the profit margin calculated according to the average profit rate of capital. This is what I advocated in the 1950's. At present, there is less open resistance to this proposal. However, not every comrade who works on economic theories or is involved in economic work can comprehend the urgency of reforming the existing price structure on the basis of production price.



For a long time, some people had made price a "restricted area" for the research of economic theoreticians. They even cooked up various ridiculous reasons to turn price into something subject to one's subjective will. For instance, they recognized that it was an economic principle for price to conform with value. However, they divorced price from value and called it putting politics in command. Under such subjectivism, the price ratio of all goods became extremely irrational. After the 10 years of calamity, the extent that price was divorced from value was especially alarming. The price of certain goods was considerably lower than their value (production price). Whereas the price of certain goods were two or three times higher than their value (production price). At present, since the purchasing price of agricultural by-products is too low and the profit of processing industries is too high, small and indigenous enterprises still reap very high profits even if their efficiency is low and their cost of production very high. Such irrational prices led to rapid increase in the number of small and indigenous enterprises. This not only wasted a lot of raw material, but also caused the suspension of work in certain key national industrial bases and technically advanced state enterprises as a result of shortage of raw material. This gave rise to a serious crisis in the supply of raw materials which further disrupted the national economic proportions. In this way, small enterprises, indigenous enterprises and enterprises with low efficiency were squeezing the large enterprises, enterprises with foreign technology and enterprises with high efficiency. This was strongly criticized in the press, such a phenomenon is the result of irrational prices. It is one of the adverse effects wrought by the divorcement of price from value (production price). The irrational prices tend to confuse and upset the various proportional relations in the national economy. Not long ago, I wrote in an article that it was difficult to maintain an overall balance in the context of irrational prices. It would be just like looking at oneself through a distorted mirror. The true picture would be totally distorted. Therefore, we must resolve the price problem in order to do a good job of maintaining overall balance. At present, such an irrational price structure is not only obstructing the reform of the national economic system and the management of the national economy, it is also an obstacle to overall balance and the readjustment of the various proportional relations. To be sure, such a situation of irrational prices came about over a long period of time. The rectification of such a situation has to be done step by step.

Second, overall balance requires accurate statistical data. Statistics is an important means to guide the national economy. Good statistics will make supervision a lot easier and will also facilitate state intervention. Our existing level of statistical work is still very poor. In order to improve planning and strengthen state control over the national economy, we must strengthen our statistical work. During the "first 5-year plan," the nation's statistical work was centrally directed. The statistical system and method of the state was centrally carried through to the whole nation. Any attempt to give false information or conceal the facts was regarded as a dishonest deed against the state. Therefore, with the exception of agricultural figures, the statistical data at that time was generally more reliable. In 1958, the so-called "dogmatism" in statistical work was being criticized. From then on, the principle of centralized direction of statistical work was abandoned. Everyone can use his own special statistical methods. Under the sway of might and the influence of the theory of upholding the human will above everything else, the statisticians could only report whatever the party or government leadership had instructed. Otherwise, they would be denounced as "rightist." I remembered that during the antirightist campaign, many chiefs of provincial and county statistical



bureaus were denounced as "rightists" and antiparty elements" because they insisted on the independence of statistical work and the principle of working on the basis of facts. In 1962, the party Central Committee rectified the nation's statistical work. The "decision to strengthen statistical work" was made according to the instructions of Comrades Liu Shaoqi and Zhou Enlai. I remember that Comrade Zhou Enlai specifically added one item that no party or government departments were to falsify statistical data. As a result, statistical work was further developed. Unfortunately, when it came to the so-called "Cultural Revolution," everything was turned upside down again. The strengthening of statistical work was vilified as "building up one's independent kingdom" and "seizing power from the party." Nearly all the statistical organizations at various levels of the nation were dissolved. After the overthrow of the "gang of four," statistical work was once again restored to an important position. However, it was impossible to restore such work to its original vitality at once especially when there still existed in varying degrees the harmful trend of party and government leaders interfering with statistical data by giving false information or hiding the facts. For instance, less arable land was reported for the sake of "high productivity" of food grains; the production value and output of substandard goods were counted for the sake of boasting about the "high speed" of industry; many projects which rightfully belong to capital construction were not reported for the sake of covering up the overextension of the capital construction front. Workers outside the original plan and temporary workers were not included in the statistics for the sake of showing that the number of workers had been "reduced to the minimum"; the number of births was purposefully falsified for the sake of showing the success of birth control; the amount of stock in store was falsified to conceal overstocking. It was even more common for the practice of artificially "supplementing those of poor performance by those of good performance," and "equalizing production." Some departments even made it a practice that less should be reported when there was overproduction and more should be reported when there was a shortfall in output. In addition to inaccurate data, the incompleteness of targets was also very outstanding. According to the calculation of the state statistical bureau, only 34 percent of the statistical targets needed for the overall balance of the national economy had been established. With our statistical work in such a backward condition, how can we do a good job of overall balance? Therefore, let me appeal for the social position of statistical work to be improved. Statistical organizations should be placed on the same level as the examining and supervising organizations. At present, the statistical management system is directly controlled by the state council and various government departments. However, they should rather be directly controlled by the various levels of the standing committee of the people's congress as are the examining and supervisory organizations. This will help to maintain the independence, strictness and accuracy of statistical work. Such a proposal is not directed at the integrity of any leading comrades. This is of the same principle as separating the accounting office of an enterprise from its cashier office. This is especially important since the statistical organization not only has to provide material for the designing and planning work of the planning organizations, it also has to examine and supervise the fulfillment of such plans. This will affect the examining and supervisory effects of a statistical organization if we allow any one department to manage or lead it. Statistics and planning are two opposite aspects of a contradiction. If we place them under the management of one organization, they will no longer be a pair of contradictions. In the past, Comrade Li Fuchun had repeatedly declared that he was not directing statistical work in his capacity as head of the planning commission but in the capacity of vice-premier. He was opposed to any planning personnel or leading personalities of party and government who distorted statistical data. The independence of statistical work is also of vital importance in

Western capitalist countries. According to the report of comrades from the Academy of Social Sciences and the business departments who have visited Western countries, the absolute independence of statistical work at the statistics centers in France is guaranteed by law. Japan also attaches much importance to the "neutrality" of statistics. Statistics are answerable only to the objective facts and should not be tempered with by party struggles. Among the socialist countries, the Central Statistical Bureau of Rumania is under the direct control of the executive organ of the National Assembly, that is, the State Affairs Committee. All this is aimed at maintaining the independence of statistics structurally. Many foreign delegations which visited our various economic departments were dissatisfied with the backwardness of our statistical work. This is a fact which we must admit. Therefore, in order to do a good job of overall balance, we must reform our statistics management system and strengthen our statistical work so as to provide accurate data for overall balance. I have recently discussed this problem in the National Conference on statistical work, I hope this forum on the theory of overall balance can make an appeal on behalf of this problem.

Third, in order to do a good job of overall balance, we should also distinguish between the simple and enlarged reproduction of capital. In the 1950's, I had proposed differentiating between simple and enlarged reproduction according to the amount of capital. All that belongs to the original capital. Such as the renovation of buildings and installations, supply of raw material and marketing of products are within the sphere of simple reproduction. This should be managed by the enterprises themselves and there is no need for any state interference. As for additional investments, they belong to the enlarged reproduction of capital and should be centralized by the state. If the state gives up its control over this, economic work would become chaotic and there can be no centralized economic planning. Practical economic work in the past 3 years has proved that the conclusions I mentioned above are well grounded. Ever since 1978, control over the original capital, that is, the management authority over the simple reproduction of the enterprises, was transferred downward. Subsequently, control over new investment, that is, the enlarged reproduction of capital, was also transferred downward. This resulted in excessive expansion of the capital construction front and additional proportional dislocation. For instance, the capital construction investment within national planning was more than 48 billion yuan. It was a 50 percent increase when compared with 1977. This had far exceeded the actual economic capacity of our country. However, the local authorities and the enterprises were also raising capital for capital construction at astronomically high cost. During the "first 5-year plan," the 156 key projects of the whole country only cost a little bit over 7 billion yuan. The 2 December 80 editorial of the RENMIN RIBAO said that "the orientation of use and scale of construction of capital raised by the local authority and the enterprises themselves should be strictly controlled. The variety and scale of construction should be examined and approved by the coordinating state departments." The enthusiasm of the locality, departments and enterprises should conform with the planned nature of socialist production. The part must be subordinated to the whole. This is the principle which the development of the socialist economy must obey. In the past, it was of course wrong to stifle the economy by one-sidedly emphasizing centralized planning. But on the other hand, if we think that there is no need for centralized planning and each one can have full autonomy to do what he wants and what he can, such enthusiasm will in the end lead to chaos. I agree fully with this. This fits in with my proposal to differentiate between simple and enlarged reproduction according to the amount of capital. Here, I suggest that when studying overall balance, comrades should integrate it with the new problems and conditions in economic

life and reevaluate the demarcation between simple and enlarged reproduction as well as the means for overall balance within these two different categories of reproduction. In the past, many comrades were differentiating between simple and enlarged reproduction in terms of quantifiable objects such as the scale of production, the capacity of the installations and product output. This is extremely unscientific. Take for instance, in terms of installation or fixed assets, a smaller number of installations might represent greater efficiency which can produce more products. Whereas a greater number of installations might prove to the contrary, in terms of quantity, a change of product composition might represent greater or smaller value even if the quantity remain unchanged. Therefore, I still insist, that simple and enlarged reproduction should be differentiated according to the amount of capital. All production which does not require additional investment by the state and within the sphere of the original capital is simple reproduction. All production which requires additional investment and outside the sphere of the original capital is enlarged reproduction. Enlarged reproduction which results from technological advances, increase of labor productivity and improvement of management and is not due to any change in the amount of capital, is within the authority of the enterprises. This should be encouraged. However, the state must strictly control additional investments. From the perspective of socialist planned economic management, what we must control is the demand for this kind of enlarged reproduction which requires additional investment.

Not long ago, with the emphasis on transferring economic authority downward, part of the control over new investments was transferred downward to the lower levels. This gave rise to the problem of over-expansion of capital construction within 1 year's time. The dislocation of national economic proportion was further aggravated and further difficulties were added to readjustment work. This illustrated that the control over new investment should not be transferred downward. After setting apart portions for collective welfare and bonuses, the remaining portion of profit retained by the central and local state enterprises for expanding reproduction should be centralized. Profits set aside by central enterprises for expanding reproduction should be centralized at the national level while those of the local state enterprises should be centralized at the provincial or municipal levels. Such authority should not be delegated to the enterprises, otherwise it would result in utter chaos. Now we are talking about controlling capital construction. It is my fear that we might go to the other extreme by being too rigid about things in the sphere of simple reproduction such as technological innovation and transformation of capital in old enterprises. It would indeed be too bad for us to relapse into such a situation. The current problem in our practical economic life is excessive expenditure especially in the area of capital construction. This resulted in financial deficit. Therefore, it is essential for us to control our expenditure. However, this is only one aspect of the solution and probably not the ultimate one. The ultimate solution is rather the development of production. We should develop the potential of old enterprises and transform them. How should we do that? If we impose excessive control over technological innovation and transformation of capital which are within the sphere of the original capital, that would just be like killing the hen to get the eggs. In the past, certain comrades who were in the theoretical field or involved in actual economic work, especially those in the finance and resource departments, were opposed to my proposal to delegate to the enterprises management authority over the original capital which is within the sphere of simple reproduction. However, not long ago, even the authority over new investments was transferred downward. Now, as soon as we talk about centralization, I hear people blaming me for emphasizing the delegation of management authority



to the enterprises. In actual fact, when talking about delegation in the past, I only referred to the delegation of management authority within the sphere of the original capital to the enterprises. As for the control over new investments, I advocated strict control and was opposed to transferring it downward to the enterprises. The problem in the past 2 years was not the transfer downward of management authority within the sphere of the original capital to the enterprises. In fact, I think such effort was inadequate. In the past, people did not pay enough attention to these problems. Some people loved the new and loathed the old. They competed with each other for additional investments. When part of the control over additional investment was transferred downward, it ended up in chaos. This was the root of all the chaos. However, it appears that there were comrades in the finance and resource departments advocating the centralization of everything. They even advocated the centralization of authority within the sphere of simple reproduction in the enterprises. They hoped to restore what the Soviet experts had taught us back in the 1950's and wanted to go back to the old path of rigid control over everything. This will once again come to a dead end.

When studying the demarcation between simple and enlarged reproduction, we must integrate it with the existing system of fixed capital renewal. As I have often mentioned, our depreciation did not take into account the invisible wear and tear of the installations. As a result, the depreciation rate was too low and the span of years of depreciation too long. In fact the transferred value of the original fixed capital, the depreciation, was treated as profit. In other words, the original investment was regarded as additional investment (in actual fact, the old enterprise was sacrificed for the sake of establishing the new enterprise) and part of the capital for simple reproduction was mistakenly placed within the sphere of enlarged reproduction. Therefore, when studying overall balance, I think such a false factor should be taken into account.

The three problems mentioned above are old stuff presented in a new context. I am talking about what I had advocated in the past in the context of the new situation for the consideration of all comrades. May I express my sincere wish for the smooth running and every success of this forum on the theory of overall balance.

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## NATIONAL POLICY AND ISSUES

### CORPORATION-FACTORY RELATIONS EXAMINED

HK130347 Beijing JINGJI GUANLI in Chinese No 2, 15 Feb 81 pp 37-40, 48

[Article by the investigation group of the Institute of Industrial Economics of the Chinese Academy of Social Sciences: "Properly Deal with the Relations Between the Corporation and the Factory--Investigation of Changzhou Tractor Corporation"--note slantlines denote boldface type]

[Text] The article "The Corporation Should Not Deprive Its Subordinate Factories of Their Autonomy--An Informal Essay on the Investigation of Changzhou Diesel Engine Factory" by comrades Huang Qidong and Sun Kelian published in JIANGJI GUANLI, No 9, of 1980, have aroused immense reflections in Changzhou municipality and various localities throughout the country. Most comrades consider that the problem reflected by Zhuang's article is one that commonly occurs and needs very much to be dealt with properly. However, some comrades who understand the situation of the Changzhou Tractor Corporation consider that there are quite a few discrepancies between the facts as mentioned in Zhuang's article and the actual situation and so disagree with the view held by the article on the corporation.

Quite a few corporations have been set up in conjunction with the industrial corporation in various localities; how to properly deal with the relations between the corporations and their subordinate factories is really a universal problem. With this problem in mind, we conducted an investigation of Changzhou Tractor Corporation in October last year. Separate interviews and site visits involving the senior management sections and cadres of the corporation, cadres of the corporation's main subordinate factories and part of the the workers were conducted. Owing to the limitation of time, the investigation was not deep enough; still, a basic understanding was obtained on the fundamental situation and existing problems of the corporation. We consider that discrepancies do exist between the facts mentioned in Zhuang's article and the actual situation (see letter from Changzhou Machinery Bureau to our editorial section on p 41 of this issue), and certain conclusive views are also biased or inappropriate. On the whole, however, the contradictions between the corporation and the factory as reflected in Zhuang's article is not a problem that is confined to the Changzhou Tractor Corporation, but a problem commonly existing in many corporations at various localities. The following are some of our views:

(1) Is the Establishment of the Changzhou Tractor Corporation Really Necessary?

The progressive movement of industrial enterprises toward the road of professionalized coordination and integration is an objective demand of socialized mass production and an inevitable trend for the development of the national economy. However, such development also has its own objective laws. Whether or not enterprises should be merged into a larger enterprise must be based on the objective needs of economic development and the availability of certain conditions, when both the needs and possibilities occur. It is entirely necessary to motivate and foster the merger. If consideration is not made in the light of subjective and objective conditions and the method of administrative instructions or cutting with one knife is adopted, then many contradictions will arise and obstruct the development of the productive forces.

Is the establishment of the Changzhou Tractor Corporation really necessary? Having conducted the investigation, we consider that the establishment of this corporation is not without grounds.

The joint production of handheld tractors by Changzhou Municipal Organizations has had a history of almost 20 years. Action was taken in 1965 to establish a tractor corporation which was then forced to disband because of the "Great Cultural Revolution"; however, the coordinated relations for production formed by adopting the loose style of "one coordinated sequence" has never been broken but has obtained considerable economic results. During the 14 years from 1965 to 1978, the state invested a total of some 19 million yuan in the "one coordinated sequence" of handheld tractors while in the same period the "one coordinated sequence" turned in profits of more than 110 million yuan to the state. The average annual increase in the number of tractors and diesel engines produced is 26 and 222 percent respectively. The 1978 output was 25 and 15 times respectively that of 1965; besides, the quality keeps improving and the cost keep being reduced. Practice has proved that the form of economic integration by "one coordinated sequence" is a way to develop production by achieving greater, faster, better and more economical results.

However while the coordinated way of production by "one coordinated sequence" has fostered the development of production and obtained good economic results, they find that there are also certain problems in the course of development. For instance, enterprises within the "sequence" are subject to the management by and multiple leadership of the first ministry of machine building, the ministry of agricultural machinery, the provincial bureau of machine building and the bureau of agricultural machinery; the loosely organized coordinated process in production lacks binding force and does not facilitate the formulation of unified development programs nor does it facilitate further improvement of the professional level of parts and accessories and technology; the aspects of semifinished products and machining, production front, technological rear and so on have not yet adapted to the process. In order to further improve the level of modernization in order to further improve the level of modernization in the course of production and the organizational level of industrial production, the reestablished the tractor corporation in January 1979 with the approval of the upper levels after almost a year's preparation.

Such being the case, we consider that the establishment of the Changzhou Tractor Corporation cannot be described as "somewhat redundant like drawing a picture of a snake and adding legs to it." In comparison with those corporations which are knocked together "in a rush" by artificially disintegrating or grouping certain

enterprises purely at the instructions of the upper levels without regard to the characteristics of production technology nor making technological or economic analysis, this corporation does have a definite basis.

## (2) What Sort of Work Has the Corporation Done?

Since the Changzhou Tractor Corporation was established, great efforts have been made to explore managing the corporation with an economic approach and quite a lot of work has also been done to further bring into play the superiority of integration so as to obtain good economic results on the original basis of "one coordinated sequence". Concrete manifestations are:

Organize coordination in production, with attention being paid to eliminating weak links in production and promoting balanced production, for instance, before the establishment of the corporation, production was unbalanced in the Changzhou Tractor Factory; the factory might be fairly quiet at the beginning of the month but was suddenly rushed into assembly work by the end of the month and one important reason for this was because the supply of blank castings was not up to the required quality or quantity. After the corporation was established, it focused on this problem and assigned whole sets of castings to the Changzhou Diesel Engine Factory, the casting supplier; also, part of the production fund of the corporation was used to help a collectively owned agricultural machinery factory to get the necessary equipment and technology for producing castings and shifted to this factory the task of producing 18 types of castings from Changzhou Diesel Engine Factory. Such arrangements have on the one hand rectified the situation of unbalanced production brought about by the inadequacy of castings in the Changzhou Tractor Factory so that the monthly equilibrium rate of the factory in tractor production and parts processing has reached 96 percent and above since the second quarter of 1980; on the other hand, the arrangements have also helped the former agricultural machinery factory solve the problem of not having sufficient production tasks.

Pay attention to strengthening quality control on a full scale so as to raise the quality of the product step by step. Although the quality of tractors and diesel engines produced before the establishment of the corporation was relatively good and both the tractor factory and the diesel engine factory have done plenty of technical and productive work on the aspect of raising the quality of products after the corporation was set up, the corporation continues to take raising the quality of products as a target, organizes and formulates programs to boost the quality of products, identifies items which need to have the quality improved and assists relevant factories to make the corresponding coordinated efforts; it also made considerable contributions in the course of events leading to the tractor and the diesel engine getting in 1979 and 1980 a silver and a gold national products quality awards.

Since the corporation places part of the funds, goods and materials as well as other resources under centralized allocation, it has obtained effects in the aspect of assisting certain small factories, especially collectively owned factories, to carry out reforms and solve some of the collective welfare problems involving the workers. Some problems in these factories have been left outstanding for a long time as a result of the inconsistency in product orientation, limited capability and capital as well as low technical standard. An example can be found in the



Dongfang Nonferrous Metal Castings Factory which is situated within the city. It has over 190 workers but is confined in space, making it difficult to develop production; in addition, it generated harmful substances during the production process, polluting the environment and disturbing the people. The factory reflected the situation to the Municipal Mechanical Bureau on several occasions but its request for assistance to overcome these problems was unable to be accommodated. Under the practice of overall planning after the establishment of the corporation, a subsidy was offered to the factory which has now made preparations for the construction of alternative premises in the suburbs to replace the existing one. Examples can also be found in factories like the agricultural machinery factory, the Jiangnan Mechanical Appliances Factory and the collectively owned Changzhou Spring Factory; as a result of assistance from the corporation, production in all those cases has had relevant development and the dormitory problem has also been solved correspondingly for part of the workers. Some factories have even begun to make surpluses instead of losses and have thus received rewards.

Reinstate the institute of agricultural machinery and make preparations to establish a professional agricultural machinery molding factory, thus providing prerequisites for strengthening scientific research, fostering the trial-manufacture of new products and strengthening the manufacturing of complete sets of equipment to support technology.

Since the establishment of the corporation more than a year ago, the production of various factories has developed considerably. According to statistics, in 1979 the whole corporation completed the programs and tasks assigned by the state 1 month ahead of schedule and, compared with 1978, the gross value of industrial output increased by 10.5 percent; a growth of 11.7 percent in profits was achieved; total costs of comparable products dropped by 3.3 percent; the number of diesel engines and tractors produced increased by 19 percent and 12 percent respectively and the quality remained excellent. For the months of January to September 1980, the number of diesel engines and tractors produced increased by 22.42 percent and 16.83 percent respectively over that for the same period in the previous year and there was an increase in output value and profits but a reduction in costs.

The above achievements cannot of course be entirely attributable to the effects brought about by the establishment of the corporation. This is because the establishment of the corporation has been running parallel with the expansion of enterprise autonomy. Most of the subordinate factories consider that it is mainly because of such an expansion of rights that the initiative of the masses of workers has been mobilized; there are also some factories which even consider that if the expansion of rights were directly allowed for factories, then as far as his factory is concerned, the achievements might have been greater. We consider that there are various factors that promote the development of production; that expansion of rights has been a primary factor in giving factories the internal impetus to develop production, but it cannot be denied too that the corporation has produced many positive effects.

### 3) The Existing Problems

The corporation has done quite a few things since its establishment; certain leading members and cadres of the corporation have also been working really hard and acting enthusiastically. Our investigation shows, however, that among the subordinate factories, more than half of those small factories under the system of collective ownership do not have much to say about the corporation; as for those under



the system of ownership by the whole people, more than half of them have expressed disapproval of strong objection, feeling that yet another administrative level has been created by setting up the corporation which does not seem to have much, if any, superiority. One or two factories which have already withdrawn from the corporation have even expressed their indignation when talking about problems involving the corporation. Why? According to our investigation, the main problems lies in the following aspects:

/First, "6-fold centralization" has imposed in business management, thus affecting the enthusiasm of factories./

Soon after its establishment, the corporation lost no time in retracting from above the rights of the factories by practicing the method of placing personnel, capital, material and the processes of supply, production and marketing under highly concentrated centralization in accordance with the experimental methods stipulated by the upper levels. This was later found not to work and the principle of progressive centralization was then adopted; but then in the course of progressive centralization, the corporation ignored its own conditions and capabilities. For instance:

In the management of goods and materials, the corporation planned to place all category 1, 2 and 3 goods and materials of subordinate enterprises under the system of ownership by the whole people under unified planning, purchasing, allocation, dispatching, marketing and management; revision was later made to the effect that non-ferrous and ferrous metals were controlled by the corporation while other items were put under the control of factories. The factories, however, felt that "the corporation takes away items that are easily managed and leaves behind for factories items that are difficult to manage." Besides the corporation does not have any depot; by converting factories depots into corporation depots, depot management staffs of various factories become management staff concurrently employed by the corporation. As a result, two sets of accounts instead of one are required in the depot management of factories and invoices must first be obtained from the corporation when a factory intends to draw out materials stored in its own depot; all of this has greatly increased the workload in factory management and movement of materials. At the same time, because the purchasing team of the corporation is not acquainted with the characteristics as well as the storage and conditions for use of the raw and semiprocessed materials required by the factories, it frequently happens that materials of the wrong quality or specifications are purchased. The Dongfang Non-ferrous Metal Casting Material Factory needs low grade aluminium for its production process but the corporation has purchased high grade aluminium instead and has thus spent more than 19,000 yuan too much. The Changzhou Diesel Engine Factory had early in the year a stock of 610 tons of ferrous metals which reached 1,100 tons by the 3rd quarter of the year, but the corporation still ordered new stock for it; the factory did not need any iron rails in its production process, but the corporation ordered 14 tons for it during the months of January to March; the factory only needed 150 tons of ferromanganese in its production process, but the corporation ordered 200 tons for it. A gear wheel factory was in urgent need of 3.5 tons of high-speed steel, but the corporation only purchased 1 ton, thus affecting the amount of material for production. In this way, the original aim of the corporation to compress the stock of goods, guarantee production and accelerate the turnover of capital by making efforts to bring about unified management has not been attained.

In the marketing control of products, the corporation carried out overall control over the main products like tractors, diesel engines and trailers. The factories reflected that this affected the direct contact between production and demand; besides, in such aspects as planning and programming, price changes, accepting orders and so on, the corporation could not decide promptly at the opportune moment, thus adversely affecting the completion of the production programs of the factories. For instance, the Changzhou Gear Wheel Factory reflected that at the provincial marketing exhibition on agricultural mechanical products and fittings held in Gaoyou County, Jiangsu Province last year, since the factory was not allowed to attend and comrades of the corporation did not understand the situation, they missed the chance to conclude a transaction involving 110,000 sets of fittings. At the same time, since factories do not have any definite right to do their own marketing, the factory which produces diesel engines which sell well is not satisfied with the arrangement while the factory which produces trailers that are not selling very well is also extremely critical about the arrangement and the 2,600 sets of trailers so far accumulated in stock have become a burden for the corporation.

/Second, the retained portions of profits are for centralized disposal: factories feel that they do not have their own say in this respect and that benefits are not evenly distributed./

At present the corporation assigns projects and tasks to subordinate factories in a centralized manner, places capital under centralized control, centralizes the allocation of bank credits, deals with accounting work involving the marketing and so on of products, fittings and materials in a centralized way, fixes prices of complete sets of raw and subsidiary materials and leading products within the corporation in a unified manner, unifies the amounts of tax and profits turned in to the state, puts the retained portions of profits under unified distribution and so on. Although the practice of returning the collective welfare funds and reward funds to factories and allowing factories to retain all the funds from the depreciation on fixed assets does not invoke any complaint from the various factories, some of them do have relatively strong objections to the corporation's practice of putting the funds for developing production under centralized disposal because then they do not have the relevant right to make their own decision. For instance, some factories feel that since their own tasks have been done well and obtained great profits, they should be allowed to retain a larger share from the funds for developing production; also they feel that centralized disposal of the funds is a phenomenon of "egalitarianism and indiscriminate transfer of resources." Besides, they feel anxious as to whether the practice of "egalitarianism and indiscriminate transfer of resources" would also be applied to the aspects of bonus and material benefits when some factories make low profits or even a loss because of poor business. The corporation has not yet come up with a better way to bring about a rational distribution of benefits among factories which have different business performances and profits. Large factories which have made great profits consider that "small factories have gained advantages" while some small factories also consider that the corporation "takes care of the large factories and squeezes the small factories" in short, each has its own view on the distribution of benefits.

/Third, the corporation's economic responsibilities are not well defined in the relations of power and responsibility between the corporation and the factory./

Since the corporation was established, the emphasis in work has been on retracting powers from lower levels and on centralizing; as to the corporation's economic responsibilities, these have not been adequately stressed nor have these been

safeguarded by any relevant rules or system. According to comrades in factories, since the corporation does not have to assume any economic responsibilities even when it brings about damage to production, operation or management aspects of factories through any of the faults it may incur either externally in purchasing raw and semiprocessed materials, selling products and entering into economic contracts, or internally in the coordination of production, while factories have the economic responsibility to complete the production tasks but do not have the relevant powers because the capital, credits and so on are all under the centralized control of the corporation; now that some factories have a rising amount of bank credits and floating capital is being allowed to lie idle, the ones to suffer should this bring about losses are mainly the factories because the corporation does not have to bear any responsibility.

/Fourth, the corporation has a big establishment, but its personnel are neither capable nor vigorous and their style of work is not thoroughgoing./

Quite a few factories reflected that when they were managed by the Municipal Mechanical Bureau before the establishment of the corporation, the managing staff was small in size; now the corporation has almost 100 workers, 2 secretaries and 6 managers. But the way some affairs are handled is not as prompt and adept as before. A small number of managing cadres of the corporation do not know their jobs well but have extremely strong bureaucratic airs and do not pay attention to serving the factories. The corporation is managed in the same way as an official department and its staff goes on or off duty at the prescribed time. Besides, it does not operate on the system of shift duty and there is no one to answer urgent calls after office hours. This makes factories feel that they have yet another "grandmother" with a low working efficiency and things are far less convenient and flexible than at the time of "one coordinated sequence."

#### (4) What Have the Above Problems Illustrated?

It is a new thing to reorganize industry and promote the integration of enterprises; everyone, from top to bottom, lacks the required experience and these problems found in the Changzhou Tractor Corporation are universal. What is called a trial-point is one which cannot be expected to yield quick success on trial but requires us to find out certain laws through the trial. We consider that a few experiences and lessons can be drawn from these existing problems:

/First, the integration of enterprises requires to under go development from a loosely organized integration to a closely organized integration and to develop step by step on a basis of voluntary participation and mutual benefit./

In the past, the "6-fold centralization" was taken as the symbol of an "enterprising" corporation and was also comprehended as "6-fold concentration" whereby all power was revested in the level of the corporation and all business matters were handled by the corporation; now it seems that such a practice is inappropriate. The blame however does not lie with the corporation but with the stipulations and demands from the upper levels. Basically, it is still mainly because of the lack of experience in both the upper and lower levels.

The aim of combining enterprises into a larger economic body in the form of a corporation is to give expression to greater economic results than the state of



disunity or it would be completely meaningless. In order to give expression to greater economic results, it is not only necessary to create the conditions to raise the professional level in production, but also demands higher organizational and managerial standards at the level of the corporation; this then demands the availability of quite a few conditions on the aspects of personnel and material (such as depot, communication facilities and so on) and also requires a process of ideological unity. The establishment of a corporation must therefore go through a process of developing step by step from looseness to compactness and has to develop step by step from a loosely organized conglomerate into a closely merged entity. As far as business matters are concerned, there can first be combination or concentration for part of them and then combination or concentration covering more of them. Go from easy to difficult and proceed from actual needs; each single combination or concentration, when effected, should give expression to economic results benefiting all parties concerned.

/Second, in the light of the law of developing from loosely organized integration to closely organized integration, it is necessary to safeguard as far as possible the right of factories to act on their own during the commencing stage or even within a fairly long period./

On the distribution of benefits, in particular, it is necessary to work out together a method of distribution agreeable to the various factories so as to link the earnings of various factories with the results of production and operation in the respective factories; however, the corporation must also have a definite right of adjusting the imbalance in hardship and pleasure brought about by objective conditions.

As regards the funds for developing production, the corporation should in principle have a definite jurisdiction over their redistribution and uses; however, during the stage of loose combination, it is also necessary to accept that the various factories should have different rights in budgeting and using these funds in accordance with the size of their profits. An alternative is: the majority of the funds for developing production should still be vested in the various factories, but the corporation is to organize the various factories to assist a particular factory in its streamlining, reform and reorganization by means of credit offers.

/Third, being a loosely integrated concern, the corporation should have as its organ of power a board of directors (or a joint committee) comprising representatives from various factories; the chairman and vice chairman of the board should be selected by democratic election and the system of having a general manager in charge under the leadership of the board of directors should be practiced./

By doing so, the corporation becomes an executive body under the board of directors which comprises members from various factories and all important issues will be centralized for decisionmaking by the board on the basis of democracy. Making decisions for implementation on problems through democratic consultation would in many cases greatly eliminate contradictions between the corporation and the factories and would have the advantage of helping the various departments of the corporation overcome the bureaucratic style and acquire the thinking of serving the factories.



When integration has developed step by step from a loose state into a state of compactness, the corporation will become one single economic body in the form of a trust and all subordinate factories will become branches within the corporation; the supreme organ of power for this type of corporation will no longer be the board of directors but should be a general assembly of representatives of the staff and workers of the whole corporation which should then practice the system of having a general manager in charge under the leadership of the general assembly of representatives of the staff and workers as is generally the case in enterprises. But even at this stage of development, it is still necessary to consider practicing management by different levels so that each factory still has a definite stipulated right of decisionmaking.

From the above account, the road taken by the Changzhou Tractor Corporation and the problems which have come up tell us that organizing professionally coordinated industrial corporations in line with the characteristics of production techniques and the principle of being economical and logical is the inexorable trend for the development of socialized mass production. However, under the situation that the current level of development of China's productive forces and the system of economic management are in need of gradual reform, it is still necessary for us to consider the various subjective and objective factors in line with our national conditions and our own actual situation when we come to the question of how to organize the corporation. Newly established corporations must stick to the basis of voluntary participation and mutual benefit, moving from each to difficult, from low grade to high grade and developing from a partly combined and loosely organized corporation toward a single entity step by step. Corporations already established, if they cannot adapt themselves to the demands of reality, should proceed from reality to improve methods after conducting investigation and research. Certain trial methods of the past, if found not to conform to reality, should also be modified; do not simply imitate or copy methods indiscriminately and must never practice "quick march" all together or "cutting with one knife."

It is gratifying that the Changzhou Tractor Corporation is summing up experience and discussing plans for reform under the direct leadership of the municipal committee and the municipal government. They have rich experience of many years in organizing "one coordinated sequence"; it is believed that they will very soon create a set of useful experiences in their continuous practice of organizing and establishing the corporation and make new contributions in promoting the integration of enterprises and accelerating the reorganization of our country's industry.

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## ENERGY

### ENERGY-SAVING ADVANTAGES OF DIESEL TRUCKS CITED

Beijing GUANGMING RIBAO in Chinese 3 May 81 p 2

[Article by Huang Kailliang [7806 7030 0081] and Ning Peizhi [1337 1014 3112]:  
"Developing Energy-Efficient Diesel Trucks is Favorable to Energy Conservation"]

[Text:] The fuel consumption of motor vehicles is very high in the industrially developed countries. In 1976, motor vehicle fuels accounted for about 41 percent of all petroleum consumption in the United States. Petroleum consumption by motor vehicles in this country is also steadily increasing. In the last few years, our country has adopted various measures to conserve motor vehicle fuels. Among them, making the motive power of motor vehicles more economical, particularly by conversion to diesel engines, has had excellent results. It is estimated that in the next 1 or 2 decades diesel engines will have the leading position in providing motive power for vehicles.

Diesel engines use less fuel than carburetor engines. High-efficiency diesel engines have significantly better fuel conservation effects than carburetor engines: they generally use 25 to 30 percent less fuel than carburetor engines of the same power. Although the fuel consumption of low-power carburetor engines is also greater than that of diesel engines, the difference is rather small. The reason is that carburetor engines use spark ignition, and the larger the cylinders the more difficult to obtain complete combustion, while diesel engines use compression ignition, so that they do not have this problem. Accordingly, high-power engines are commonly diesels, and lower-power engines are generally of the carburetor type.

In addition to cylinder size, in deciding between carburetor and diesel engines we must also take account of the conditions under which the engine will operate. Motor vehicle engines generally operate at partial load and in the low part of the RPM range. These circumstances bring out the advantages of diesel engines and are particularly beneficial for fuel conservation. But agricultural diesels and engines operating at a fixed motive power, which generally operate constantly at full load and at a fixed speed, save relatively less fuel. Accordingly, abroad diesel engines are preferentially used in motor vehicles.

Actual operating circumstances and experiments also make it clear that diesel engines save more than a third on fuel as compared with carburetor engines. According to nationwide statistics for 1978 from the Ministry of Communications, the fuel consumption per hundred ton-kilometers is 6 liters for diesel-powered vehicles and 8.5

liters for carburetor-engine vehicles, a difference of almost 40 percent. The Wuxi Diesel Engine Plant converted a Jiefang truck to diesel operation using a commonly used diesel engine which it produces; the truck was given operating tests by the Beijing Municipal Transport Company, with the result that fuel consumption was 4.25 liters per hundred ton-kilometers, a saving of 42 percent.

Such oil-poor countries as the European nations and Japan had already begun to convert trucks to diesel engines in the late 1960's. All trucks with capacities of 4 tons or more in West Germany have diesel engines, as do 95 percent of those with capacities between 2 and 4 tons. In Japan most trucks with capacities of 2 tons or more are diesels. In India, whose circumstances are similar to ours, diesels account for more than 95 percent of all trucks. In this country only trucks with capacities of 8 tons or more use diesel engines, accounting for only 4 percent of truck capacity. In view of the abovementioned circumstances, our country should revise its fuel allocation policies. In the future small-sized engines should be predominantly of the carburetor type, as should those with fixed motive power. On the basis of the 1978 production standard, if half the diesel engines of model 195 and below were replaced by carburetor engines, this would release 200,000 to 360,000 tons of diesel fuel, which could meet the needs of the equivalent of 60,000 to 107,000 4-ton diesel trucks.

At present, this country's No 1 Motor Vehicle Plant's diesel engines are of an out-moded type which has long since been abandoned abroad, with a minimum specific fuel consumption of 255 grams per horsepower-hour and a consumption of 7.25 liters of fuel per ton-kilometer--true "gas guzzlers." The No 2 Motor Vehicle Plant's diesel engines are automotive carburetor engines which are relatively good by domestic standards, with a minimum specific fuel consumption of 235 grams per horsepower-hour and 5.6 liters per hundred ton-kilometers, which is still not a low value. Given out process, technological and materials standards, it will be rather difficult to further decrease the fuel consumption values. Accordingly, we must devote some effort to conversion to diesel engines; for example, we could use the diesel engine which the No 1 Diesel Plant is now experimentally producing, which has a minimum fuel consumption of no more than 170 grams per horsepower-hour and 3.3 liters per hundred ton-kilometers.

Currently the total annual output of Jiefang trucks is over 70,000, and figuring an annual mileage of 30,000 kilometers each, if they were all converted to these diesel engines and were all used under the same transport conditions, they could save more than 200,000 tons of fuel compared with carburetor engines; if all of the medium-sized carburetor-engine trucks which the country now has were converted to diesel engines, an annual saving of 3 million tons of fuel could be realized, equivalent to 2 billion yuan.

To summarize the foregoing, developing diesel trucks should be made an important reform in energy policy and should be thoroughly investigated.

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## ENERGY

### CONSERVATION OF ENERGY, BUILDING MATERIALS URGED

Beijing JIANZHU (BUILDING CONSTRUCTION) in Chinese No 2, 1981 pp 9-12

[Article by Lian Zhong (1670 0112): "Act Energetically To Conserve Energy and the Three Building Materials"]

[Text] Among the basic tasks of our construction industry system are those of trying to conserve funds, energy and materials, particularly the three building materials (steel, cement, wood), which are of extremely great importance. This article presents some views and opinions regarding technical measures and further work to conserve energy and the three materials.

#### 1. The Construction Industry Is a Department With Great Energy Conservation Potential

Energy is an important question of national economic development. Our country's energy reserves are rather large, but on a per capita basis they are far from ample. The per capita energy consumption is only 0.6 tons, 1/19 of the figure for the United States and 1/6 of the figure for Japan. In addition, energy use efficiency is low and there is considerable waste. Currently the effective energy utilization efficiency for the countries of Western Europe is over 40 percent, that for the United States 51 percent, and that for Japan 57 percent, while for our country the figure is only 28 percent. Energy supply-demand conflicts have been prominent for many years, and because the energy shortage is considerable, many enterprises operate below full capacity, which has gravely affected the development of the national economy. Accordingly the policy of "equal stress on development and conservation, with priority accorded to conservation in the near term" issued by the Central Committee is entirely correct.

The construction industry is one of the departments which use relatively large amounts of energy. In addition to its consumption of conventional energy such as coal, oil, and electricity, such construction materials as steel, cement and brick are materials which consume rather large amounts of energy. Conservation of building materials is in reality an important aspect of energy conservation. The scope of energy conservation in construction is broad, including energy used in production, energy used in construction, daily-use energy and the like. Daily-use energy refers primarily to energy consumed from day to

day in households for heating, air conditioning, lighting, cooking and the like and is of course related to the level of the people's standard of living. In the economically more developed countries, daily-use energy generally accounts for a fifth to a third of the national energy consumption. Production-use energy and construction-use energy are the energy used for the production of various types of building materials, for equipment manufacture, for structural members and parts, for construction-related transportation and for installation. Accordingly, the construction industry is a department with considerable energy conservation potential. Some experience and results have already been obtained on the basis of work in various localities.

1. Steam Conservation. In 1979 cement consumption in the construction industry system was 14.3 million cubic meters, of which about a third was steam-cured. Because of differences in the curing process and the kiln design, energy consumption varies widely. For example, a prefabricating plant in Jinan uses a zigzag tunnel steam curing kiln, which requires 150 kg of steam per cubic meters of concrete, while the Xiangtan vertical kiln in Hunan uses 105 kg, and the zigzag kiln in the first construction office uses 300 kg. Some localities use pit-type kilns with steam consumptions as high as a ton or more; thus the range of variation is extremely great. Many prefabricating plants have made no conscientious attempt to deal with the problem of steam conservation. Accordingly, selection of a curing method must involve conscientious analysis and comparison of all the local relevant conditions, and in selecting a rational kiln shape and curing process, particular attention must be given to improving the thermodynamic properties of existing kiln shapes and creating efficient curing systems. Excess heat, natural curing and solar-energy curing must be used as much as possible.

2. Boiler Coal Conservation. Every year our country uses about 30 million tons of coal for heating, and the potential for conservation is great. Most of the boilers now in use have the faults of high coal consumption, slow steam production and high energy consumption. In order to conserve coal, boilers with high thermal efficiency should be chosen and advanced combustion processes used. For example, the Harbin Construction Industry Institute and the Changzheng Boiler Repair and Manufacturing Plant in Harbin jointly developed a boiler for either hot water or steam, which has a working pressure of 13 kilograms, a water feed temperature of 150° C and a boiler thermal efficiency of 70 to 80 percent, and in addition have simplified boiler room equipment and piping, leading to a saving of 15 to 20 percent on equipment investment, thus making a new style of boiler available to small and medium-sized industry and to heating for the public. The Beijing No 6 Construction Company and Office No 1 directly subordinate to the General Office began in 1971 to make steady improvements in boilers, using positive pressure-coal feed and a heat collective canopy, eliminating the intake blower and positioning the air distributing plates efficiently, with the result that the boiler temperature is stable, it is convenient to operate, and the annual coal and electricity savings are great.

3. Gasoline and Electricity Conservation. The construction industry uses large amounts of gasoline and electricity, and there is much untapped potential in this area too. Regarding gasoline conservation, the Nanjing City

construction industry office and the Hunan Province construction office truck pool developed a "triple-throat carburetor" and a "nine-hole perforated plate reinforced throat" to improve gasoline vaporization and achieve complete combustion. According to statistics from the Hunan No 4 Company's truck pool, gasoline consumption per hundred km dropped from 24 kg to 18.6 (the state standard figure is 22 kg). An "automatically-controlled electromagnetic induction vortex heating waste gasoline recovery device" developed in Hunan enables 1 shift to recover 100 kg of gasoline and kerosene from waste cleaning gasoline. In the area of electricity conservation, some localities are using wind cooling, circulating deep-well water as an air conditioning cooling source, and automatic-turnoff stairway light switches, and have achieved excellent results. All of these experiences merit further study and dissemination.

**Use of New Energy Sources.** Currently attention should be given to developing solar energy and infrared energy. Sichuan has adopted the new technology of steam-far infrared drying of wood, which not only is a simple and inexpensive process, but provides excellent drying quality and decreases the drying time from an initial 120 hours to 30-36 hours; coal use per cubic meter has been decreased from 134 kg to 33 kg, and the cost has been lowered from 18 yuan to 3.7 yuan. Yunnan and Shandong Provinces are using frames covered with plastic sheeting for solar curing of concrete structural members, which is also a simple and effective curing method. Solar water heaters are in rather wide use. But the use of solar and infrared energy is only in its initial stage in the construction industry, and some technological problems need further study.

## 2. Act Energetically To Conserve Wood, Cement and Steel

Every year there is a shortage of the wood, steel and cement which our country's construction industry needs, so that the requirements of basic construction cannot be met. Accordingly, doing everything possible to save the three materials and prevent waste, while maintaining quality and use characteristics, is a long-term task.

**1. Conserving Wood.** Some 60 to 70 percent of the wood used in construction is used for forms and scaffolding, while a considerable quantity is also used for doors and windows: this is the focus of wood conservation. In recent years many places have made extensive use of steel to replace wood, achieving excellent results. Steel forms are easy to assemble and disassemble, have a wide range of uses and are durable and even-surfaced, which decreases costs and accelerates the pace of construction. At the end of 1979 the Shanghai construction industry office had 50,000 square meters of steel forms; the Beijing construction office is already using 12,000 square meters of steel forms. Other organizations such as the Tianjin, Qingdao and Changzhou municipal construction offices and the Hubei and Hebei provincial construction industry offices, general offices and No 2 office, have had excellent results in using the steel forms. At present the problem with steel forms is that their design is not very advanced, the machining quality is still inadequate, and maintenance is still something of a problem. We must intensify research



on the design of steel forms and produce rigid, adaptable standard forms with sufficient machining precision for various types of structural members. We must also make a conscientious effort to manage them properly, set up a strict maintenance and management system and establish reasonable distribution and fee collection methods. Areas which are able to, can create steel form plants and unify their design and machining and their rental, installation and maintenance, so as to raise steel form technology to a new level. As for steel scaffolding, the Beijing construction industry office uses bridge-type steel scaffolding for building exterior installation and maintenance, the Shaoyou municipal construction company in Hunan uses movable metal scaffolding, the general office's Office No 4 uses steel tube scaffolding and rotary ascent and descent scaffolding, and so on, all of which have had an excellent effect in conserving wood.

In addition to replacement of wood by steel, attention is also being given to increasing the degree of comprehensive use of wood and the yield realized. The wood fiber corrugated board produced by the Shanghai No 2 wood-processing plant, the wood fiber sandwich-type interior-frame doors produced by the Shanghai construction office, and the composite sandwich-type doors pieced together from short pieces of wood by the Handan Wood Composition Shop in Hebei have all saved large amounts of wood.

The use of plastic in place of wood is just beginning. The polyvinyl chloride railings produced by the Beijing Building Design Institute and the Beijing Plastics Materials plant were officially put into extensive use in engineering in 1973 after more than 10 years of testing; and the Qingdao municipal construction office uses low pressure polyethylene film coatings in its sheet materials plant's mileisheng (1378 5132 0581) board, achieving rather good results; this is an important technical approach which should receive continued study and development.

2. Conservation of Cement. The approach which achieves the greatest effect is to mix powdered coal ash or a dehydrator with the cement. The mixing of powdered coal ash with cement and mortar was an important measure for conserving cement in the 1950's, and has undergone new development in recent years. Recently Beijing found in tests that each ton of finely ground coal ash added to cement achieved a cement saving of 0.67 tons, while the saving with mortar was about 0.75 tons of cement. Starting in 1978 the Shanghai construction office used more than 4,500 tons of powdered coal ash as an aggregate, decreasing cement cost by about 2 percent and mortar costs by about 4.2 percent. Some experience has been gained in Shanghai, Baoji, Changzhou and elsewhere in the experimental use of coal ash-silicate wall panels for the construction of dwellings and plants.

Cement dehydrators are a type of externally-applied additive which has developed rather rapidly in recent years. The types most commonly used in our country are wood sulfonates and naphthalene sulfonates. Calcium lignosulfonate dehydrator underwent technical evaluation in 1978 and was found to have a dehydrating rate of 10 percent, producing a 5 to 10 percent saving on cement, so that use of a ton of the dehydrator could save approximately 20 to 40 tons of cement.

Other types of dehydrators are being developed in various localities. The use of dehydrators is an effective way of conserving cement, and the various localities should make thorough use of local resources for the purpose. The raw materials for dehydrators are numerous, and paper mill wastewater, coke plant byproducts, and residual black naphtha from coal gas, wastewaters from medicinal plants, tar from petroleum cracking, and molasses and humic acid can be used, but only by proceeding on the basis of local conditions can economic and efficient results be realized. In order to put dehydrators into wide use it is necessary to create normal production-supply relations and to assure a source of supply, after which it will be possible to proceed and to realize the benefits.

In order to conserve cement, it is also necessary to make thorough use of local materials and to develop the production of clinker-free and low-clinker cement. Jilin, Inner Mongolia, Liaoning, Shandong, Anhui, Shanxi and other areas have obtained a certain amount of experience using volcanic ash, pumice, gangue and the like.

3. Conserving Steel. Popularization of prestressed concrete structural members should be continued and attention should be given to the use of plastics and to rational design and machining of steel structural members.

Prestressed concrete structural members are not only particularly needed for large spans and heavy load bearing structures, but in addition have excellent structural rigidity and durability. Prestressed medium and small structural members using cold-drawn low carbon steel wire have been developed in recent years, are characteristically Chinese, require only a small investment, and are simple to produce and economically effective. As large bays, large networks of columns and large load bearing structures become more numerous, high strength steel reinforced prestressing technology will develop further. Current integral prestressed structures and nonadhesive processes have already achieved results, and are playing a role in replacing steel structures and conserving steel. In this connection it is necessary to have a proper understanding of the applications of prestressed steel materials and of the production and application of anchors and tensioning equipment, and localities which are able to do so can create a prestressed products development base and special tension crews so as to promote the further development of prestressing technology. New types of structures such as steel tube concrete structures, spiral-type ball joint reticulated structures, saddle-shaped shells, double T plates, V plates, thin Y-shaped beams and the like have some effect in conserving steel. Double reinforcing techniques are now undergoing testing and experimental production, and under certain circumstances they have a steel content equivalent to that of prestressed structures.

As the plastics industry develops, replacement of iron and steel by plastics is becoming a feasible technical approach. Shandong and Tianjin are using polyethylene for sewer pipe, which decreases production costs and saves large amounts of cast iron, and can increase effectiveness and decrease the amount of heavy physical labor.

In keeping with their different conditions, many localities are using poured pilings and pilings made of mortar and lime mortar as well as the vibration method of compacting foundations, which are rather effective in conserving concrete, and steel and decreasing manufacturing costs; serious attention should be given to investigating and popularizing them.

### 3. Make Additional Effective Efforts To Conserve Energy and the Three Materials

In keeping with the requirements of further readjustment of the national economy, it is hoped that all localities will make conserving energy and the three construction materials an important aspect of their work and will make a conscious effort to develop good 1981 technical development and popularization plans. They should propose technical development and dissemination projects, clear objectives and measures for their implementation, in terms of real local conditions.

In dealing with effective new technologies we should actively organize their dissemination and continually improve them while they are being popularized. In popularizing all new techniques attention should be given to bringing the economic benefits into play, and effectively assuring engineering quality. The popularization of all new technology should be scientifically based and should be proceeded by test use, and one technology should be matured before proceeding to another. In order to do the work of developing and popularizing major new technologies successfully, experimental technical development centers can be set up, under the leadership of the highest-level cognizant departments, and a certain technical cadre assembled in them, and investigation, development and popularization of certain sets of specialized technologies organized. Included will be continuous improvement of sets of technologies, creation of production units for the necessary implements and materials, furnishing of technical data, the writing of process regulations and technical specifications, organization of technical exchange, training of technical personnel and technical consultation. Examples are Jiangsu's vibrator-compacted concrete floor slab technological development center, the prestressed concrete development centers which Sichuan and Zhejiang are preparing to set up, and the powdered coal ash comprehensive utilization technology development center which Shanghai is preparing to set up. These approaches may be considered by all localities.

There are many ways of conserving energy and the three materials. Approaches that have already been taken should be continually improved, while new approaches should be investigated and new avenues constantly opened. Currently, goal-directed projects of great economic significance should be subjected to intensified scientific investigation. Examples are: investigations of ways of improving the insulating characteristics of buildings, research on improving the capabilities and efficiency of construction equipment, studies on improving energy supply methods, investigations of the use of solar and infrared energy, research on comprehensive utilization of industrial wastes and local resources, studies of energy conservation in concrete component curing processes, investigation of steel form design and manufacturing processes, studies on the replacement of wood by plastics and the like. The localities should propose



research topics and determine their focus and pace in accordance with their local conditions and characteristics and should organize and coordinate them effectively and avoid duplication of effort.

In order to implement conservation measures it is necessary to have a corresponding economic policy. Some organizations in Shanghai already have an awards system for powdered coal ash utilization, in which each ton of coal ash used qualifies for an award of 5 yuan when used on site and 2 yuan when used in a prefabricating plant. The relevant state departments have formally stated their agreement and suggested that 5 to 8 percent of the value of the savings should be used as bonuses, which will be beneficial to the development of new technology. But the methods used by some localities are not suitable for the development of new technology, or even hinder it. These should be improved and economic policy used to encourage production and construction organizations to utilize new technologies. This requires that the whole situation be kept in view and that comprehensive plans be formulated, so that state, enterprises and collectives all will receive the benefits and the development of conservation of energy and the three materials will be encouraged and promoted.

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## ENERGY

### ENERGY CONSERVATION IN BUILDING DESIGN DISCUSSED

Beijing JIANZHU [BUILDING CONSTRUCTION] in Chinese No 2, 1981 pp 12-13

[Article by Design Office, State General Construction Office: "Approaches and Methods in Energy-Saving Building Design"]

[Text] In some economically developed countries, energy consumed in buildings accounts for more than a third of all energy consumption, and the international building world has made energy conservation in buildings a current topic in building science.

There are no formal statistics on the proportion of energy consumed in buildings in this country, but according to relevant data, coal consumption for heating in Shenyang accounts for a third of all fuel consumption. Some plants in Harbin use two times more fuel in the winter than in summer, primarily for heating, and electricity consumption for air conditioning in certain public buildings in Beijing is equivalent to the total power use of a medium-sized city in the initial period after liberation. Some people estimate that total energy consumption in buildings may account for about a quarter of total energy consumption.

#### 1. Energy Consumption in Buildings in This Country Is Very High

Since the state was founded, our building design standards have consistently been rather low, in keeping with our country's circumstances. But with low building standards we also have high energy consumption. For example: 1. The vast majority of buildings are still heated by dispersed small boiler rooms (or even small single-family coal stoves). The performance characteristics of small boilers are out of date, in addition to which they work poorly, with a heat efficiency of only about 50 percent and even lower for small coal stoves; which means that about half of the coal is wasted in the boiler rooms, in addition serious environmental pollution results. 2. Heating systems are generally of the intermittent type, in which the boiler is sometimes running and sometimes off, which results in an efficiency 10-20 percent below that for continuous boilers. Because "the hot air is not hot," design organizations generally increase the number of radiators, thus wasting materials while failing to solve the problem. 3. No attention is given to heat retention in heat pipes, and heating pipe thermal losses in some cases 7 percent or more. 4. The condensate in steam heating systems is generally not recovered, which results in a heat loss equivalent to a third of the input. 5. Building enclosing

structures are becoming increasingly thin. In the Shenyang area, 49-course brick walls were generally used in the 1950's; later the number was decreased to 37, and in recent years the heat characteristics of some large-panel buildings are even worse, so that moisture condenses on the panels in the winter and heat losses are great. 6. Windows and doors are not tight, but pass large quantities of air; in some workshops, the amount of heat lost through a large doorway can amount to 1 percent of the total energy used for heating the building. 7. The air conditioning and cooling load is generally set too high, resulting in "a large horse pulling a small cart"; in some hotels the air conditioning standards exceed current U.S. standards. Trained personnel are not available to manage the air conditioning systems, resulting in wasted energy. 8. Illumination sources and lamps have low efficiency. The illumination efficiency of fluorescent lamps is generally 80 lumens per watt abroad, while it is 60 lumens per watt in this country. Insufficient use is made of natural lighting, according to surveys; because a 5,000 square meter shop lacked window-cleaning facilities and maintenance was poor, the glass was fouled by the atmosphere and the number of hours when natural light could be used was decreased by two-thirds, wasting 200,000 kilowatt-hours of electricity a year. 9. Buildings have serious water leakage and corresponding energy waste. According to surveys in Shanghai City, because of poor quality parts and bad piping, toilet leakage alone was equivalent to the entire output of one water works; and there were other instances. The high level of energy consumption in our country is rather shocking. Comparing energy conservation standards in the United States with design in this country, heat losses through walls and windows here (including air leakage) are 45 percent higher than in the United States. A large amount of energy is lost from boilers, chimneys, piping systems, walls and cracks around doors and windows. If we do not give a high priority to decreasing consumption, it will be difficult to improve the people's housing standards.

## 2. Approaches and Methods of Energy-Conserving Building Design

The approaches to energy-conservation building design should focus primarily on increasing energy use efficiency and decreasing heat losses rather than on lowering construction standards, because there is much potential in these approaches. In recent years, these ideas have begun to attract the attention of relevant quarters and some experience has already been acquired. Effective ways of conserving energy have already been studied, for example renovation of heating boilers, boiler automation, continuous operation of heating systems, high-temperature hot water heating systems, the use of natural wind cooling, the use of underground water from deep wells for air conditioning, improvements in walls, the use of solar energy and geothermal energy, improvements in kilns, utilization of waste heat and excess heat, use of high efficiency light sources and the like. In general terms, energy-saving building construction has already achieved some preliminary results. The current problem is that some design organizations or design personnel are not sufficiently aware of the importance and urgency of energy saving design and especially lack the necessary understanding of the comprehensive nature of energy saving techniques; they generally believe that "building standards are already low, and a stress on saving energy might lower them even more" or think that energy-saving construction involves just one or two specialized matters with no relation to



their own specialty. In some cases, in order to improve the external appearance of buildings, building designs using large glass areas have been copied in areas with cold climates; design in some industrialized building construction systems stresses material conservation and light structural members, so that insufficient attention is given to the insulating properties of external walls. Domestic and foreign experience shows that the architect is the person who leads the way in design, and accordingly energy conservation should also begin with the architect. Architects should take suitable measures not only in their own specialized type of design activity (i.e., overall layout, building orientation, shape, selection of enclosing structures, tightness of windows and doors and the like) so as to increase energy use efficiency, but should also create the proper conditions for other trades to do so and should reconcile contradictions between the different trades, while the individual trades should also adopt a comprehensive view and cooperate with each other so that building design will embody optimum overall results.

### 3. Some Suggestions for Energy-Conserving Design

Currently certain design measures which produce a rather large effect should be actively pursued. These include: 1. Centralized heating, which can greatly increase boiler efficiency and decrease environmental pollution. In particular, in new residential areas and tract construction projects, central heating should always be installed. In cities, the creation of heat supply companies for unified heat supply should be considered. 2. If continuous heating cannot be used universally, then at least continuous boiler operation should be adopted, with the heat being supplied to different areas in rotation. 3. Various types of building insulating materials should be developed, including such types as hollow brick, hollow block, foamed concrete, light aggregates and the like. Some products such as slag wool which show promise as panel materials or finished products should be used more widely. 4. Improve the manufacturing quality of windows and doors. Particularly at present, when wood is scarce and many localities have changed over to simple steel windows, it is to be hoped that account will be taken of materials conservation and decreasing energy losses and that window and door quality standards will be developed (including air passage and air leakage standards). 5. Building maintenance and management should be improved, and the operators of boilers, water pumps, air conditioning systems and electrical distribution systems should be trained. 6. Building design should include suitable automation instruments, which are inexpensive and produce a large conservation effect.

At present many countries have already drafted building energy conservation laws, which have strict, clear, quantitative specifications regarding the heat engineering characteristics of enclosing structures, permissible air leakage around doors and windows, design parameters for various building equipment systems and the like. Some countries' energy conservation laws were drafted in the wake of the 1973 oil crisis and have already been revised several times. Our country should organize a group to draft building energy conservation regulations and standards. In addition, we should coordinate relevant technical and economic policies with reference to energy conservation.

For example, all aspects of the relationship between materials conservation and energy conservation should be considered, as should building energy consumption, including both construction (materials production, transportation, construction work and the like) and operation (heating, air conditioning, lighting and the like). According to foreign data, the ratio between these two varies from 1:5 to 1:9. If excessive stress is laid on conserving materials so that day-to-day energy consumption is increased, this lowers overall efficiency.

Energy-conserving building design research should be pursued in systematic fashion. In addition to developing individual new materials and designs, we would do well to examine foreign experience and undertake some experimental energy conservation projects. For example, a heated residential area and an air conditioned public building could be selected and complexes of energy conservation measures applied in order to accumulate experience and set an example.

A well-functioning energy conservation management system should be constructed. Surveys and research should be intensified, and the same type measurements should be used to accumulate typical energy consumption figures for the various regions of the country and various types of buildings. Energy conservation awards should be given for design and research projects which have outstanding energy conservation results. Consideration should be given to energy conservation in selecting the best designs or construction jobs. In standard housing design consideration should be given to providing each household with the "three meters" (waste meter, electric meter and gas meter).

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## CONSTRUCTION

### BRIEFS

**BUILDING MATERIALS INVESTIGATIONS**--Scientists and technicians of the nationwide building materials scientific and technical information network have conducted investigations throughout the country and acquired a basic understanding of the scientific research, production and resources of building materials. They have sponsored mobile exhibitions of new-type building materials in 2,500 units in 18 provinces, municipalities and autonomous regions. Now more than 150,000 people throughout China have received general knowledge on new-type building materials and more than 400,000 square meters of houses have been built in Beijing, Shanghai, Shenyang, Hebei and Jiangsu with new-type building materials. From 8 to 13 May, the national building materials scientific and technical information network conference was held in Changsha, Hunan, to sum up experiences and make plans for the period of readjustment. [Changsha Hunan Provincial Service in Mandarin 1100 GMT 13 May 81 OW]

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## TRANSPORTATION

### THIRTY YEARS OF RAILROAD TUNNEL BUILDING IN CHINA REVIEWED

Beijing TOMU GONGCHENG XUEBAO [CHINA CIVIL ENGINEERING JOURNAL] in Chinese Vol 14 No 1, Mar 81 pp 51-55

[Article by Liang Wutao [2733 2976 1269], Chen Chengzong [7115 2052 1350] and Cheng Sheng'ao [2052 5110 5063], Southwest Research Facility, Ministry of Railroads Scientific Research Institute: "A Survey of Railroad Tunnel Engineering in China"]

[Text] Construction of railroad tunnels in China began in 1889, and by 1949 there were 238 tunnels with a total length of 89 kilometers on 20,000 kilometers of standard gage lines, amounting to 0.4 percent of the total line length. Some narrow gage tunnels had been built before 1949, and some of these were abandoned after 1949, so that there now remain 191 with a total length of 23 kilometers. In the 30 years between 1950 and 1979, a total of 3,957 tunnels were built on standard gage lines, with a total length of 1,897 kilometers; half of them were in the four provinces of Shaanxi, Sichuan, Yunnan and Guizhou. Including pre-1949 tunnels, by the end of 1979 the country had a total of 4,386 tunnels with a length of 2,009 kilometers.

In the 30-year period, about 30,000 kilometers of new trunk and branch rail lines were built, with tunnels accounting for about 6 percent of the length. There are six lines on which tunnels account for more than 20 percent of the length; they account for 34 percent of the length of the Xiangyu [Xiangfan-Chongqing] line and 31 percent of the length of the Chengdu-Kunming line, including 79 percent of the section from the Jinkou River to the Wusi River, 29 percent of the second Fengsha line, and 57 percent of the section of the Baocheng [Baoji-Chengdu] line between Yangjiawan and Qinling.

In 1965 construction of new railways in mountainous regions greatly expanded, with an average of 100 kilometers of tunnels being built a year.

In terms of regional geology, China's geotectonic regions (plates) are the Pacific Coast structural region, the Paleosiasitic structural region and the Himalayan structural region (Tethys). The great majority of present railroad tunnels are in the Pacific Coast structural region and the zones associated with it. The Pacific Coast structural region includes the Central Korean pseudoplatform, the Yangzi pseudo-platform and the South China, East China Coast and Taiwan fold systems.

The Central Korean pseudoplateau rests on deep metamorphic systems, and the cover is mostly shallow ocean sediments, but in general the structural changes are mild, and rock body integrity is relatively good. The western part of this region is extensively covered with loess, and the development of cracks in the rock body of tunnels is a particular problem.

The Yangzi pseudoplateau has extensive carbonate strata (limestone and the like) and karst regions are well developed. The main problems in this region are sudden outbursts of karst water, loss of stability of the filler of karst caverns, and undercutting of tunnels. This area also has rather large numbers of red clastic rock systems (sandy shales), and many tunnels are built in weak rock bodies. Tunnels through coal-bearing strata also have the problems of gas emission and corrosion.

In the South China geosynclinal fold system, early Devonian strata have undergone much local shallow metamorphism, while the Mesozoic structures have undergone extensive changes, and there has been much magmatic activity. In this area there is relatively little fluctuation in the topography, and the area is in the subtropical zone, with extensive weathering; although there are not many tunnels, there have been cases of loss of stability of tunnel entrances and tunnels themselves as a result of weathering.

In the Qinling fold system area, where three structural regions come together, there are nearly 400 kilometers of railway tunnels. Because the topography and geology are extremely complex and variable, the stability of the enclosing rock is poor; and in metamorphic series with structural fissuring, jointing and schistosity the situation is even worse.

In the Sichuan-Yunnan north-south structural belt where the Pacific coast structural region and the Himalaya (Tethys) structural region join there is a total of 341 kilometers of tunnels and the topographic and geologic conditions are rather complex. There are eruptions, erosion and swelling of salt-containing and gypsum-containing strata, large numbers of springs and the danger of loss of stability of tunnels passing through fracture zones.

Tunnel-related engineering geological surveying initially only involved strip geologic cartography, and the survey methods involved only survey excavations and use of small drilling rigs. Later, when the locations and routes of tunnels through mountains and difficult areas were being selected, rather large-area geologic surveying and mapping were done rather than limited strip surveying, so as to select the most favorable approach; at the same time the model 500 drilling rig and electrical survey methods began to be used. Gradually, comprehensive use of a variety of surveying and experimental methods began, and 1,000-meter drilling surveys were even used for some deeply-buried tunnels, but in most cases only vertical boreholes were made; there have been only a small number of slant holes, and horizontal drilling surveys have not yet come into use.

Physical surveying has involved primarily electrical and seismic methods. Elastic waves (seismic waves, acoustic waves and ultrasonic waves) came into use in the 1970's. Downhole television and remote sensing have also begun to be used, and samples taken on-site have been subjected to various mechanical tests in the laboratory in order to determine the characteristics of the enclosing rock.

Because detailed geological surveys can forecast that tunnels will encounter difficulties, many tunnels have been correctly designed and smoothly built.

Some 154 tunnels over 2 kilometers long have been constructed; 10 of them are more than 5 kilometers long, and the longest is the 7,032-meter Yimaling tunnel. The two-track Dayaoshan tunnel, on which work has just begun, will be 14.3 kilometers long.

In the early 1950's, the principle that "the most economical method is when the per-meter price of the road cutting is equal to the tunnel price" was generally used to determine the location of a tunnel opening, and accordingly the design lengths of railroad tunnels in areas of mountains and rivers where the geology was poor were excessively short, and there were frequent cases of loss of stability or collapse of the rock body, which endangered trains, so that later they linked tunnels together. Thereafter, the principles of "go in early and come out late, better inside than outside, and better deep than shallow" were used for determining tunnel locations. In choosing between a long tunnel, a more roundabout route and a change of gradient the following four principles were taken into account:

1. Total expenditure for each approach;
2. Transport operation expenditures over 10 years;
3. Construction time with reference to state requirements regarding date of opening of the railroad, present rates of advance in tunnels, and the nature of fitting out;
4. Geological circumstances, with consideration of the consequences of bad geological conditions for each approach.

In new tunnel construction in this country the most commonly used type of auxiliary tunnels are transverse tunnels and parallel guide tunnels. In all suitable cases in mountain and river terrain, transverse holes are used, which greatly increases the working area. Guide tunnels were first used in 1957 in the Liangfengya tunnel on the Sichuan-Guizhou line, and for the last 20 years 80 percent of tunnels 3 kilometers long or more have been built using parallel guide tunnels. Use of these tunnels can provide tunnel ventilation and decrease transport interference in use of the sectional cutting method and is beneficial for drainage during operation, but extensive use of parallel tunnels increases investment expenditure.

Vertical shafts and slant shafts are relatively uncommon. On the Qinling, Wuxiaoling, Jiamashi and Dongshanping tunnels a total of five vertical shafts were used. The deepest was a 136-meter shaft on the Qinling tunnel. All of the shafts were sealed up when operation began except the vertical shafts on the Jiamashi tunnel which were kept open for machinery ventilation. Slant shafts were first used in the 1950's on the Yanpingguan tunnel on the Baoji-Chengdu Railroad, and thus far a total of 37 slant shafts have been cut for 17 tunnels. The maximum digging speed for slant shafts is 114 meter per month, while the average is about 40 meters. The longest slant shaft was 314 meters long. Slant shafts are generally cut at angles between 18° and 22°.



With regard to the enclosing rock classifications it uses, this country has passed through three overall stages. The first stage was during the 1950's, when the Soviet rock strength index  $f_{\text{rock}}$  was generally used for classification; rock was grouped into nine classes based on strength. As railroad tunnel building experience was accumulated, it was discovered that this classification was rather limited, and it was gradually corrected by taking account of the structural characteristics of the tunnel enclosing rock and the subsurface water conditions. The second stage began in the early 1960's; the index  $f_{\text{rock body}}$  was used as a classification standard, producing 6 categories. The relationship between the two indices is  $f_{\text{rock body}} = f_{\text{rock}} \cdot K$ , where  $K$  is a scaling-down factor whose value is generally determined by geologists on the basis of experience. The third stage began in 1975, when an enclosing rock classification based on stability began to be used; on the basis of their degree of integrity, fracture condition and strength, rock bodies were classified as completely stable, generally stable, temporarily stable and unstable. There were two other subcategories, producing a total of six classes. Research on the bases and quantitative aspects of enclosing rock classification standards is continuing, resulting in further satisfaction of the needs of design and construction.

The dimensions of the tunnel contour after it is lined with concrete poured into forms above track level are in accordance with the tunnel construction boundary specifications given in state standard GB146-59; the arched portion is a three-centered arch, which also satisfies electric traction requirements. There are two kinds of tunnel liners, the straight-wall and curved-wall types; inverted arches are not used in soft rock.

The enclosing rock pressure taken into account in the design loading of poured concrete tunnel liners has also undergone a certain development in railroad tunnel construction. For a long time, flexible loading was used as the design loading, i.e., the specific gravity of the part of the rock body which was disturbed and made flexible by construction operations was taken as the design loading; the  $P_u$

[phonetic] pressure arch height ( $h = \frac{B}{af_{KP}}$ ) was calculated to obtain a

uniformly distributed load pattern. The lateral pressure was determined from the formula  $3 = (q - \gamma y) \cdot \tan^2(45^\circ - \frac{\phi}{2})$ . Allowance was made for the characteristics

of the underground structure. The calculations allowed for elastic resistance of the rock body, i.e. a constraining effect of the rock body on liner deformation. Starting in 1975, based on the new enclosing rock categories and large numbers of enclosing rock pressure measurements, and using tunnel construction cave-in statistics, a regression equation ( $h = 0.45 \cdot 2^{6-s}$ , where  $s$  is the enclosing rock category) was obtained for use in determining design loading; at the same time allowance was made for various loading distribution patterns, and the active lateral pressure was taken as  $e = a \cdot q$  (where  $a$  is a coefficient). In recent years experimental studies and theoretical analysis of the effect in injected anchor supports on enclosing rock supporting ability have been made.

Junction measurements of almost 4,000 tunnels have essentially proven that the tunnels' elevations and center lines have been correctly chosen. In 1954, in the first stage of construction of large numbers of tunnels, rather large deviations were found in the center lines of one or two tunnels; thereafter, survey design was

always required before surveying was begun on straight line tunnel 1,000 meters or more long and curved tunnels 500 meters or more long. The survey precision obtained by calculation was used for surveys, with the result that all long tunnels were correctly cut through. For control in plan, the "single guideline closed circuit" error theory was used and a preliminary estimate of the junction error was made; this method is still in extensive use today.

With regard to surveying methods, because distance measurement is difficult in mountainous regions, triangulation nets are used for most long tunnels. In recent years opto-electronic range finders have gradually come into use and the main and auxiliary guideline method has begun to be used for control in plan; this method is used, for example, for the 14.3-kilometer Dayaoshan tunnel. In surveying for placement of vertical shafts, extended triangulation surveying has been used with satisfactory results.

In keeping with the characteristics of tunnels through mountains, our triangulation network is different from the geodetic method; for example, it does not require calculation of spherical angles and positioning data. In the 1970's deviations in baseline conditions in plan were ignored, which has simplified calculations and decreased distance measurement precision requirements. This country's geodesists have made theoretical deductions about tunneling error resulting from the combination of angular observation, angular deviation in plan and closure of triangles of arbitrary shape, and the combination of directional observation, directional deviation in plan and closure of triangles of arbitrary shape. There has as yet been no explanation of the calculation of tunneling error resulting from the combination of directional observation, angular deviation and closure of triangles of arbitrary shape.

Tunneling machinery is mainly small-scale mining equipment. In the 1960's some compact switching-yard type equipment was designed and experimentally produced, and in the 1970's some continuous debris loader designs (such as a shuttle-type mine car) were experimentally produced and used in large-sized rock drilling equipment for full cross section cutting of single-track tunnels (such as hydraulic rock drilling vehicles), but such equipment is relatively scarce.

Because most of the machinery is small-scale mining machinery, the partial-cut method is used in most tunnels. The total length of tunnels cut by means of the full cross section single cut method is about 12 kilometers. The partial-cut method is primarily based on the upper and lower guide tunnel method; when the enclosing rock is of relatively good quality the tunnel is walled first and arched afterwards, and when the rock is of poor quality it is arched first and then walled. In tunnels with relatively good rock strata, the positive bench method, the reverse bench method and the mushroom method are used.

In mechanical rock breaking, 3.5 meter and 5.5 meter diameter tunneling equipment has been used in some tests, but the shot hole blasting method has been used for most tunnels. Cutting methods are classified as straight hole cutting and slant hole cutting. The depth of the blasting hole is 1.5 to 2.5 meters in small cross section arc-shaped guide tunnels with a small cross section of about 10 square meters, where hand carried pneumatic drills are used; in single-line tunnels with full section cutting and an area of about 40 square meters, when a frame-type hydraulic rock drilling vehicle is used, the depth is 2.4 to 4.0 meters. The

number of blasting holes is 2.5 to 3.5 per square meter in small cross sections (about 10 square meters) and 2 to 3 per square meter in complete cross sections (about 40 square meters). The explosive fills two-thirds of the hole in the case of digging [Juejin 2228 6651] and more than two-thirds in the case of cutting [taocao 2223 2864]. According to statistics the average blasting hole utilization rate is about 85 percent.

Because there has been serious overdigging in many tunnels, in the 1970's smooth-surface blasting began to be used on the arch contours, while on the periphery of boundary walls precracking blasting is used, not only producing even tunnel walls but also making disturbance of the enclosing rock easier. When using thin blasting sticks, the amount of explosive used per meter of blasting hole is 300 grams or less, and the imbalance coefficient is 2. In tests made in tunnels through muddy shales (class III-VI soft rock) and muddy phyllites where the geological conditions are even worse (class II-III), after blasting the blast hole traces in the walls amounted to 70 to 80 percent.

In weighing indicators of tunneling progress, we generally include average amount of tunneling done per month from the beginning to the end of construction in a single opening and maximum monthly tunneling speed for a single opening. According to statistics, thus far the average monthly rate of progress from a single opening has been 70 meters or more on 57 tunnels, and 100 meters or more on 23 tunnels; the record is for the Guancunba single-line tunnel on the Chengdu-Kunming Railway, where the average rate of progress in a single opening was 153 meters.

Statistics for 1,200 long and short tunnels show an average monthly rate of advance of 23 meters. Broken down by length of tunnel, the average rate was 13 meters on 759 tunnels which were 0.5 km long or less; 27 meters on 203 tunnels 0.5 to 1 kilometer long; 43 meters on 162 tunnels 1 to 2 kilometers long; 53 meters on 15 tunnels 2 to 3 kilometers long; 71 meters on 15 tunnels 3 to 4 kilometers long; 87 meters on 6 tunnels 4 to 5 kilometers long; 83 meters on 3 tunnels 5 to 6 kilometers long; and 113 meters on 4 tunnels 6 to 7 kilometers long.

In order to increase the rate of advance, it is first necessary to increase the efficiency of drilling the blasting holes, loading the explosive, detonation, ventilation and debris loading so as to decrease the time required, and to change the blasting hole depth and cycle time suitably so as to achieve optimal blast hole depth and increase the number of cycles. In the digging of small-section guide tunnels with areas of about 10 square meters, from the beginning of work until the tunnel was cut through the average monthly rate of advance was 184 meters; the highest tunneling rate in a single month was 359 meters. The full section single-pass cutting method for single track tunnels (with a cross sectional area of about 40 square meters), was used in certain sections of 21 tunnels with a total of 12 kilometers of tunneling; the average monthly rate of advance in seven of these tunnels was 108 meters, and the maximum monthly rate of advance was 200 meters.

Wood is used for temporary supports in most of this country's tunnels; wood and cement block retaining walls and arches are used for permanent support. In the arch-first-wall-later method, oversized arch feet and thin walls have been used. By allowing for the constraining effect of the rock body on tunnel liner deformation and by pouring the cement liner into forms, the same kind of construction material has been used to line overdug sections from the arch foot upward about a meter.



In the 1960's, fast-curing additives were successfully developed, and injected anchor supports were used in some tunnels. In the first stage they were used in enclosing rock of class IV or higher, then were gradually employed as permanent supports. In order to expand their range of use in the full-section single-cut method, when relatively weak rock was encountered the construction method was not changed; injected supports were successfully used in the weak enclosing rock (muddy shale, class III-IV) and in even weaker muddy phyllite (class II-III). In recent years the anchor injection method has also been used successfully to strengthen cracked liners.

Because of imperfections in geological forecasting, late installation of supports, blasting disturbance of the enclosing rock and removal of forms too early, there have been cases of cracking of the liner or rock body in tunnels through soft rock or in new loess tunnels. Cracks in the liner are classified as longitudinal, transverse and random cracks; in terms of stress analysis they are classified as tension cracking produced at the inner side of the liner and compression spalling. In construction, most of the longitudinal cracks are produced at the arch waist and top. Most transverse cracks are produced near the opening of the tunnel, while the width of random cracks is greater above than below, and is greatest at the top of the arch, followed by the arch waist, and smallest on the side walls; they are inclined at about 60°. To deal with transverse cracks, a transverse expansion seam is left about 10 to 20 feet from the end of the tunnel, to relieve the cracking. Random cracks at the top of the arch result from uneven settling of the two sides, and it is necessary to return and make repairs at various stages during construction work.

When a second line is being added at one side of a tunnel already in use, as the excavation progresses the older tunnel is subjected to an uneven load, so that the side farthest from the second tunnel will move inward at the top of the arch, while the inner side of the arch top will be subject to excessive compression, and will spall.

In addition to serious cracking of the liner during construction, another survey made of tunnels 10 years after repairs found longitudinal cracks along the curve of the arch to be most numerous, accounting for about 80 percent of all cracks; these longitudinal cracks were most numerous at the arch waist. There was also spalling at the top of the arch as a result of compression.

In tunnels through weak rock and through loess, transverse and longitudinal cracks and semi-encircling cracks may be produced in the rock body. Longitudinal cracks generally develop on the two sides of the tunnel's center line as cutting of the arched section proceeds. Transverse cracks develop at the mouths of tunnels where the natural slope is rather steep. Semicircular cracks have a clear relationship to expansion of the arch section, and their position in plan is in the area before the expansion of the arched section. The faster the rate of expansion the faster they develop. After 10 years' use, a survey was made of random cracks at the top of tunnels through loess; no traces of cracking were found.

About a third of all tunnels in operation have some degree of water seepage, and attention is currently being focused on efforts to control it. Control methods include deepening drainage ditches and increasing their number, building additional sidewall drainage holes and grouting rock strata.

In karst areas, solution caverns are generally encountered in the course of tunnel construction. Depending on the size, shape and position of solution caverns, different approaches can be taken. The problem was solved by changing the tunnel route in the case of the Laohuzui tunnel on the Guizhou-Kunming line. This case involved an empty cavern of a vertically-oriented shuttle shape, with a diameter of 45 meters at the railroad grade level, and a depth of about 300 meters below it and a height of about 200 meters above it. The tunnel through Jiaoding Mountain on the Yigong line is an empty solution cavern; because the solution cavern was too large to be dealt with easily, the tunnel was built through it.

#### Current Problems and Problems Requiring Further Resolution

1. There is a lack of effective geological surveying and forecasting techniques. Currently the main method used in tunnel surveying is vertical boreholes; not only do they have a small survey range, but the effective core utilization rate is low. In the future more use should be made of horizontal boreholes, in combination with many types of geophysical exploration methods, so as to improve forecasting results.
2. The rate of construction progress is not high enough. The average monthly tunneling rate at each end of single line tunnels is a maximum of 152 meters, and the rate is over 100 meters for only 23 tunnels. We still need to improve production efficiency and increase the average monthly tunneling rate at each end.
3. The degree of construction mechanization is low. Most existing tunnel construction machinery and equipment is small-sized mine equipment, and accordingly the partial-cut approach is used for many tunnels. Tunneling machinery is rather extensively used, but the degree of mechanization of concrete pouring in forms is lower.
4. Construction organization and management are insufficiently scientific. Most of the persons in charge of construction use their own extensive experience with construction and construction methods to organize their plans and production indicators; as a result there is a lack of exhaustive statistical analysis of data and scientific methodological guidance to provide a basis for organization and management of construction work.
5. Further studies and improvements should be made in regard to enclosing rock classifications, enclosing rock load computations and enclosing rock stress measurements.
6. There are problems with tunnels already in use. One class of problems is those which should not arise given proper measures during construction, such as the existence of some degree of water seepage and leakage in one part of a tunnel so that icicles are produced in severe winter weather, threatening traffic safety and leading to damage to the entire roadbed and cracking of the liner. Another group of problems results from poor management. An example is, tunnel ventilation problems: the designs of 136 tunnels called for ventilation equipment, while it has only been installed in 40, and the equipment that has been installed is in normal operating condition in only three locations.

## CONSTRUCTION

### CONSTRUCTION OF XIAMEN SPECIAL ECONOMIC ZONE DESCRIBED

Hong Kong CHING-CHI TAO-PAO [ECONOMIC REPORTER] in Chinese No 12, 1981 pp 7-8

[Article by Zhou Shimin [0719 0013 3046]]

[Text] Last December, the State Council officially approved the construction of the Xiamen Special Economic Zone and set aside 2.5 square kilometers of land at Huli in the northern part of Xiamen Island as the site of the special zone.

Now ground levelling work has begun at Huli, and the other capital construction projects which are to begin soon include roads, water supply, sewage, electricity, telephone, teleprinting, factory buildings, warehouses, residential housing and an administrative center. The design and scope of this special zone are based on both the targets set by the state and the best experience of foreign countries. The roads are designed to accommodate the anticipated volume of vehicular and pedestrian traffic with space reserved for greenery. A new urban center to match the pace of growth and the worker population will be constructed near the industrial area. It will include residential housing, a school, a hospital, a business service center, a bank, a post office, daycare centers and nurseries, a park and movie theaters. Built close to the industrial area, this small town will be kept separate by a belt of greenery but will be easily accessible to public transportation. Instead of building the whole project all at once, the construction will move from section to section to keep pace with actual occupancy.

The Huli special economic zone was chosen out of several competing proposals. It is only about 3 kilometers from the newly constructed Tongdu Dock, and is close enough to an urban center and yet separated from it by the Xianyueshan, easy to manage and good for both construction and production. My visit to the area convinces me that Xiamen, an excellent harbor which is expansive, deep, calm, does not freeze and is well sheltered from wind, forms a midway port of Far East shipping north to Shanghai and Japan and south to Hong Kong and Southeast Asia. Today, Xiamen is already a bustling port of call of worldwide shipping. However, the existing port facilities are inadequate to keep pace with these new developments. The Heping Dock, the largest existing dock built in the 1930's (known before the liberation as the Taigu Dock), is adequate only to berth two 3,000-ton freighters. Ships over 4,000 tons which call at Xiamen have to load and unload by tender at their anchorage away from shore. The dock facilities are outmoded. Inadequate warehouses and stacking space slow down loading and unloading efficiency and affect the management and transshipment of cargo. To meet the requirements of the



special economic zone, the state has appropriated 130 million RMC for the Tongdu District to construct the Tongdu Dock. The first phase of the project, scheduled for completion in 1982, will be finished next October if the current pace is maintained. This includes a berthage for 10,000-ton ships and another for 15,000-ton ships and other related projects such as a railroad, stacking grounds, an office building, a dormitory for staff and workers, transportation facilities within the dock area, utilities and communication facilities. The second and third phases of the construction will begin as soon as the first phase is completed. Once the Tongdu Dock for freight is open for business, the passenger-freight dock at the Yingjiang Road seaport will be used exclusively for passenger traffic.

The Gaoqi Airport, which has been idle for over 30 years, is being activated and upgraded for air connections between the special zone and the outside world. I am told they are going to install telephone and teleprinting facilities at Xiamen to expedite transportation and communications between Xiamen and the outside world.

Some people are concerned that Xiamen, too far from Hong Kong and Macau, will not be able to compete with Shum Chun and Shekou. The concern is unjustified. Xiamen is only 290 nautical miles from Hong Kong, a 2-day voyage by steamer. Passenger traffic between Xiamen and Hong Kong began a year ago, and freight shipments will do equally well. Processing products for export would not affect the business relations with Hong Kong and Macau firms if goods were delivered on time according to specifications. If Xiamen could develop itself fully as a seaport, it would be well poised to undertake processing of exports not only for Hong Kong and Macau but also for other Far East regions (such as Japan and Southeast Asia). Not long ago, a prominent Singapore business leader asked for the formation of a triangular economic cooperation between China, Singapore and Japan. Since Xiamen is the midway point on the Singapore-Japan shipping line, I think it is a worthwhile idea to make Xiamen one of the three points of that triangle of economic cooperation. Xiamen, a well-known homeland of overseas Chinese, is the gateway of all overseas Chinese of Fujian. We know that all overseas Chinese, the compatriots of Hong Kong and Macau and ethnic Chinese residing overseas, are keenly interested in the construction of their homeland. Some of them are well experienced in industry, commerce and banking; some are versed in science and technology; while others are interested in investing in profitable and well-protected areas. Their enthusiasm for construction of their homeland could be brought into full play by the correct policy, reasonable and favorable terms, and patient preparations. Many of them know the international market very well and have good connections with foreign businessmen. They could serve as a bridge in Sino-foreign trade.

Many export-processing or free trade areas in foreign countries specialize exclusively in processing exports. The Xiamen Special Economic Zone is primarily for processing exports, although there will be diversified developments in its economic relations with foreign countries. According to Lu Zifen [7120 5261 1164], deputy chief of the Xiamen Special Economic Zone Management Council, agriculture, animal husbandry and breeding will be developed outside the 2.5-square-kilometer area because Xiamen covers Tongan Xian and over 1,000 square kilometers of villages and coastline. Xiamen, a scenic spot, and Gulangyu, "a garden on the sea," are both the homeland of overseas Chinese, good for tourist trade and residential housing. The existing factories within the city limits can cooperate with overseas and foreign investors (the Tobacco Company of Xiamen is already working with American

investors to produce Camel cigarettes). Many factories in Xiamen, such as those producing glass plate, rubber, engineering machinery, sensitive paper, porcelain, electronics, leather, bearings, and forging presses are already good enough to cooperate with foreign and overseas Chinese investors and brush up for the competitive international market. Deputy Chief Lu also made it clear that "if a foreign or overseas Chinese investor wants to build a large or medium-size industry but cannot find land at Huli, he may be accommodated elsewhere. If the products he turns out are for export, he will still enjoy the preferential treatment accorded to enterprises in the special zone." So the development of the Xiamen Special Economic Zone is a very flexible project targeted for export processing and other economic activities. New enterprises may stay either within or outside Huli. It encourages the construction of new enterprises as well as cooperative development of the existing ones. Thus, the pace of the development of the Xiamen Special Economic Zone could be speeded up by working through different channels under a general guiding principle. The regulations and preferential measures of the special zone are based on what was passed by the 15th session of the Standing Committee of the National People's Congress (the regulations of the Guangdong Special Economic Zone). According to Deputy Chief Lu, as soon as they have had enough experience with these regulations, they will work out the regulations of the Fujian Special Economic Zone for submission to the higher authorities for approval.

The foreign investors are quite concerned about the term of land utilization, land use fees, business income tax and labor management. The special zone authorities are preparing detailed rules governing these matters which they will submit to the Standing Committee of the provincial people's congress for approval and promulgation. Before these rules take effect, these matters are determined by contractual agreements which will remain binding even after the promulgation of the rules. The term of land used for factories is generally 20 years and may be extended. The term could be longer for a large enterprise with higher technology and longer term of investment. These are negotiable on the merit of each case. The fee for the use of land is generally lower than that charged at Shum Chun because Xiamen is farther away from Hong Kong, Macau and other international markets. The fee is also negotiable, depending on the location of each lot. The income tax rates and preferential measures are specified in the special zone regulations. An exemption or reduction of tax may be reached by agreement, depending on the turnover period of investment, degree of technology and amount of investment. Some may enjoy reduction of the tax for a number of years while others may be exempted for a number of years. To enable an investor to earn more profit and expand reproduction, he may be allowed to withdraw his equipment depreciation annually, in periodic installments or all at one time. I think these preferential measures are just and favorable to both the development of the special zone and the investors.

Both foreign and overseas Chinese businessmen complain that business negotiation procedures are too cumbersome, slow and inefficient. In fact, this is true. Deputy Chief Lu said the problem will be resolved as soon as the Special Zone Management Commission is established. According to a solution already worked out, the provincial government has authorized the Special Zone Management Commission to settle all problems arising from the foreign economic contacts of the special economic zone. All overseas Chinese and foreign investors who propose to set up factories in the Xiamen Special Economic Zone; to cooperate or engage in joint

ventures with any existing factory in the Xiamen area; to lease land; to build or lease factory buildings; to run tourist business, agriculture, animal husbandry or cattle breeding; or to construct residential houses therein may apply to the Special Zone Management Commission for speedy action.

It is understood that the Xiamen Special Economic Zone Management Commission has set up various specialized departments and enterprises. For instance, its construction development corporation is authorized to solicit and negotiate investments. When the negotiated investments are approved and registered by the Bureau of Industry and Commerce, its construction office will provide the land or factory buildings required. An investor who wants to build his own factory may ask the construction office to design and build it for him. He may also design the building and ask the construction office to build it. He may import his design and building materials and equipment not available in our country and leave the construction work to the construction office. The special zone has an international trade trust company to help any investor procure materials and equipment made in China or market his products in China with the approval of the management commission. It also handles export and import business.

In his discussion of the supply of labor, Deputy Chief Lu said the human resources in Xiamen are adequate to meet the needs of the special zone. Labor may be recruited in Xiamen and in the whole province of Fujian if Xiamen does not provide enough workers. An investor may apply to the Labor Service Company for the kind of workers he needs and the company will recommend the workers it has selected. The investor may hire the best qualified workers by contract acceptable to both sides. A worker who breaches the contract may be discharged by the investor. If the investor violates the contract, the worker may apply to the Labor Service Company to settle the dispute. The wage may be agreed upon by both parties, and the investor may award bonuses to those workers who score good production results. The special zone authorities are trying to establish a minimum wage for all trades. An investor may pay more but not less than the minimum wage. The minimum wage of a particular trade would be based on the wage level of that trade in our country, plus such subsidies as housing, food, commodity price and medical subsidies. It is too difficult to hire workers with technical skills. The comparatively high educational level of the youths of Xiamen makes the training of technicians much easier. To meet the needs of the special economic zone for technicians and specialists, the special zone authorities are pursuing a number of preparatory projects. For instance, they have asked the Xiamen University and other colleges and academies in Xiamen to expand their admission of new students. They will establish the Lujiang College, a vocational college, and admit more students to schools for technicians.

It seems Xiamen is committed to the construction of the special economic zone. Proceeding cautiously with the preparations, the policies and measures adopted are moderate and flexible. Of course there are difficulties and problems ahead. However, if the whole city works wholeheartedly, they will eventually overcome the difficulties and resolve all the problems. At present, the conditions of the Xiamen Special Economic Zone and its policies are not widely known either overseas or in Hong Kong and Macau. I think the responsible departments of the special economic zone should use publications, broadcasts, propaganda materials and brochures to launch a publicity campaign abroad. They might also convene various kinds of meetings and forums to solicit opinions and comments which would help them to run the special zone more successfully.



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